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THE IDE ENGINE.

The Automatic Cut-Off Engine, Made at Springfield, Illinois.

A SMOOTH-RUNNING, EFFICIENT AND ECONOMICAL ENGINE—PARTICULARLY ADAPTED TO ELECTRIC LIGHTING PLANTS—CONSTRUCTED ON A CORRECT INTERPRETATION OF NATURAL LAWS.

The importance of reliable, and above all, smooth-working engines in an electric lighting plant, cannot be over-estimated. We have seen an electric lighting distributing station filled with the most ingenious and costly apparatus, unable to efficiently perform its function because the engines that worked its shaftings were of uneven motion. It is absolutely necessary that electric lighting promoters should understand — many have learned it to their cost—that engines which readily prove serviceable in a saw-mill are an expensive luxury when attached to an electric lighting plant. Experiment with them as much as you will, they will fail you at the very moment when efficiency was most to be desired. Hence it is with not a little satisfaction that we present in this issue of the REVIEW a series of representations of the Ide Engine [Fig. 1], which has shown a special adaptability to the wants of electric lighting plants.

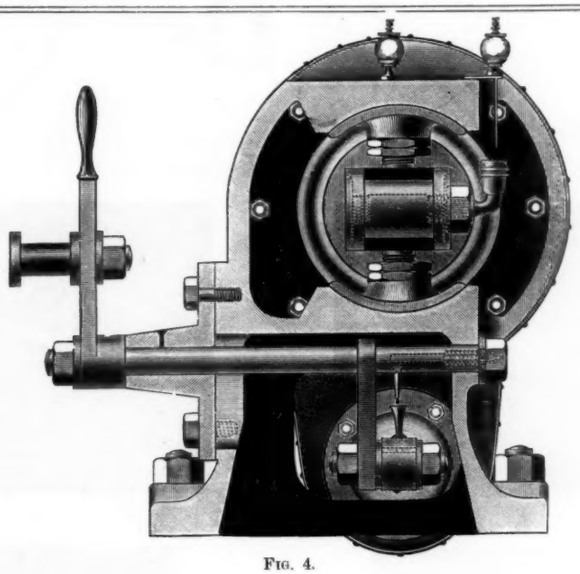

FIG. 4.

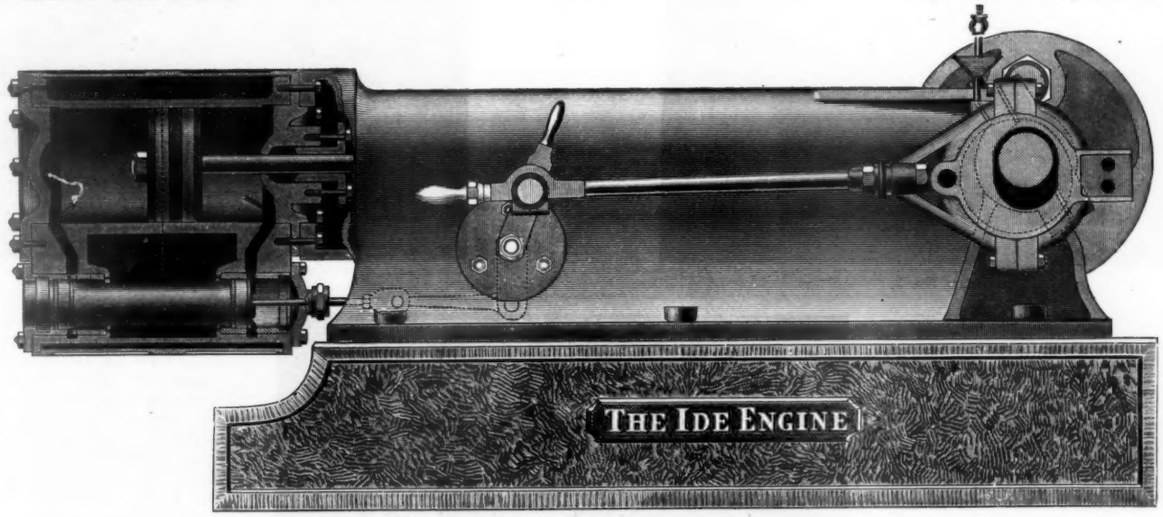

FIG. 3.

The advantages of the Ide automatic cut-off engine are regular speed, economy of fuel, and general simplicity of parts It has a singularly efficient valve and governor, which are set and adjusted by the indicator to operate perfectly under varying loads and any steam pressure.

By its high rotative speed, smooth-running, perfect regulation and reliability, it is especially adapted for direct connection with electric lighting plants. It has great strength and rigidity of parts, and a comparatively large amount of metal above the center line.

It gives the utmost economy in the use of steam, the governing and regulation of speed being unsurpassed. The working parts are all steel or bronze. The top and front side of frame is planed and scraped; cylinder and steam chest jacketed with wood and covered with polished brass, secured with German silver bands, and on all bearings there are nickel-plated, visible-feed oilers and lubricators.

By high speed, compression and reduced friction, the Ide engine saves ten per cent. in fuel over those of many other makes. It is unnecessary here to discuss the advantages and economy of an automatic cut-off and steam expansion as compared with a throttling governor engine. The slide valve and throttle-governed engine takes full steam every stroke, working heavy or light—the Ide engine takes only enough to do the work required of it.

Any intelligent person will admit that, with two engines of the same size and construction, each being properly proportioned and adapted to their work (one having automatic cut-off governor, and the other a throttling governor), the automatic cut-off will require one-third less fuel and one-third less boiler to do the same work. The question, then, is only how soon will the saving in fuel pay the additional cost of the automatic engine.

This depends upon the price of fuel where the engine is used. In the majority of cases the money saved in fuel will soon pay the additional cost of automatic engine, after which you have a superior engine at no additional cost, and ever after it is a source of revenue as compared with the common engine.

The economy of high speed engines is at this time being fully investigated by scientifically conducted experiments by Professor Thurston, of the Stevens' Polytechnic Institute, and his report will show the economy and efficiency of high-speed compression engines.

The moving parts of the Ide engine are only one-fourth the weight of a slow speed engine, and the friction or power required or absorbed in running the engine is fifty per cent. less than the average engine. By its system of compression and balancing the moving parts, friction is reduced to almost nothing, and it is in effect practically converted into a rotary piston engine. It will run up to full speed, and do work with from three to five pounds steam pressure.

The durability and good service of machinery depends, in great measure, on the lubrication. The best constructed and most perfect machine can be seriously damaged or utterly ruined by neglect or imperfect lubrication. This specially applies to fast running machinery and high-speed engines. The Ide engine has a very perfect system of lubrication. All bearings are fitted with visible-feed glass oilers. The cups being glass, the engineer can see when they need feeding, which is accomplished by simply turning the cap one-eighth of a turn. This opens a large hole to receive the oil, and a vent to allow the air to escape. The feed of oil is regulated by the thumb-screw on top. Each drop of oil is seen as it passes from point of the pin through the opening to the bearing, and the engineer can always see and know that each bearing is being constantly oiled.

The quantity of oil required is very small, but it should be continuous, especially on the crank-pin, pillow-block and eccentric. Each of these bearings has the oilers supported in such a position that they are in plain view, and the engineer can readily see if they are feeding constantly, and can fill them while

the engine is running. All oilers are nickel-plated, and each engine is furnished with one of the best makes of sight-feed lubricators for oiling the inside of cylinder and the valves.

The eccentric rod is connected to the rock-shaft with a drop-hook, which is fitted with a bronze metal bearing, so arranged that the wear can be taken up. A turn of the handle slackens the hook so it can be lifted off the pin, and engine-valve can be reversed by hand to warm up the cylinder, and relieve it from water before starting. It is also very convenient to use in backing the engine to assist in starting, and for reversing the engine to detect lost motion, or too much play in crank-pin, cross-head or pillow-block bearing.

The steam chest is cast on the lower side of the cylinder, and is bored out and fitted with a pair of steel cylinders or bushings. The valve is of the hollow piston type—a hollow tube with a piston on each end—and is placed beneath the cylinder to drain it from water.

In order to make a successful and serviceable piston valve, it must be what its name indicates—in other words, it must be a piston in a cylinder, rather than a plug in a hole. The use of steel bushings for this purpose

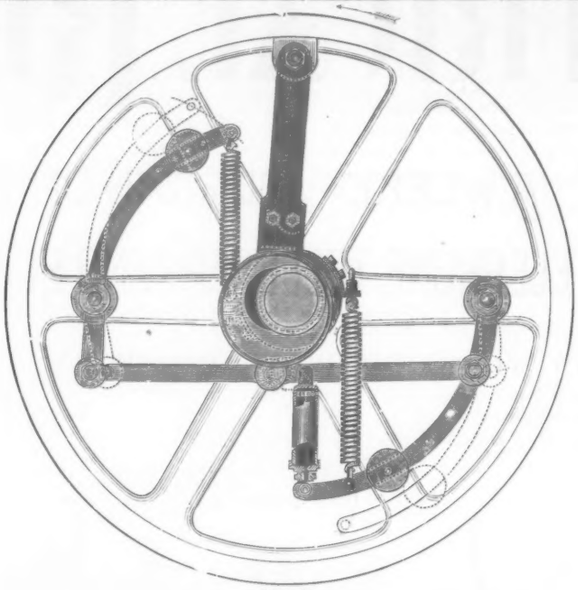

FIG. 5.

This construction makes a rigid frame that will not yield or spring, and all bearings will run cool when engine is running at a rapid speed and driving heavy loads with high steam pressure.

The cylinder is made from hard, close-grained, charcoal iron, same as is used in car wheels. It is cast without heads, and the forward head, with its stuffing-box, is held between cylinder and frame.

The cylinder is secured to end of frame, and overhangs. This construction insures a perfect alignment of the working parts at all times, as the cylinder is free at front end to expand when heated, and in so doing it does not put a strain on the engine frame or foundation, and cannot spring the frame and throw working parts out of line, the result of which is heating or breaking of parts.

Two important points are gained by placing the steam chest and valve below the cylinder. Only dry steam enters the cylinder from top of steam chest, and all water will pass off at opening in bottom of steam chest. The steam ports being on bottom side of cylinder, all condensation in cylinder passes directly out with the exhaust steam. No cylinder cocks are required.

The simple valve, entire valve gear and eccentric are shown in the cut. One turn of

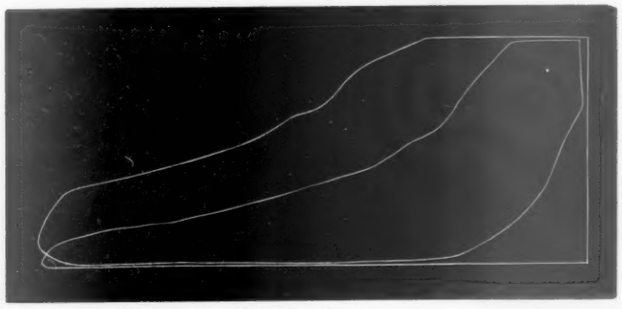

DIAGRAM NO. 1.

DIAGRAM NO. 2.

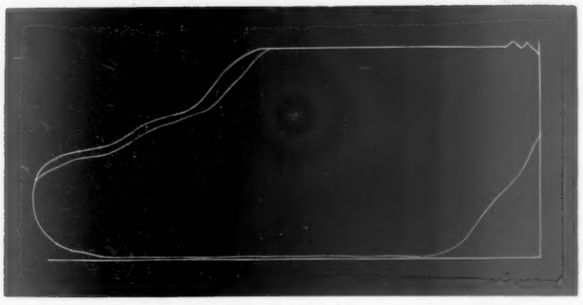

DIAGRAM NO. 3.

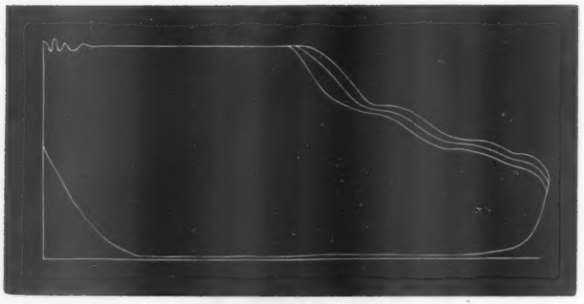

DIAGRAM NO. 4.

enables the cylinders through which the valve travels, to be made hard and ground true, with numerous bars across the ports to guide and support the packing rings of the piston as they pass over the ports. Each end of the piston is fitted with a single steel spring ring, which is wider than the ports, and this, with the supporting bars, prevents a possibility of the rings catching in the ports, and insures equal wear. This arrangement gives a pair of steel pistons fitted with steel spring packing, traveling in a pair of steel cylinders so hard that the passage of steam cannot cut or groove them.

The valve is surrounded by steam, which presses equally on each piston, thus maintaining the valve in perfect equilibrium. It is perfectly balanced, and entirely relieved from pressure or friction, and will remain so. There is no wear except the weight of the valve itself, which is very light—only twenty pounds—for an eighty horse-power engine.

A ten year old boy can reverse the valve while the largest engine is working under one hundred pounds steam pressure. This frictionless valve insures lasting service, is a safeguard against loss from leakage, and the extreme sensitiveness insures the perfect working of the cut-off governor, and close regulation.

The recess in the bottom of the steam chest receives any dirt or grit that may come from the boiler. It also remains filled with oil, which insures the constant lubrication of the pistons and cylinders. If by any means the valve-cylinders should become cut or worn, they can be withdrawn and new ones inserted, and a new valve furnished without delay, and at a small expense.

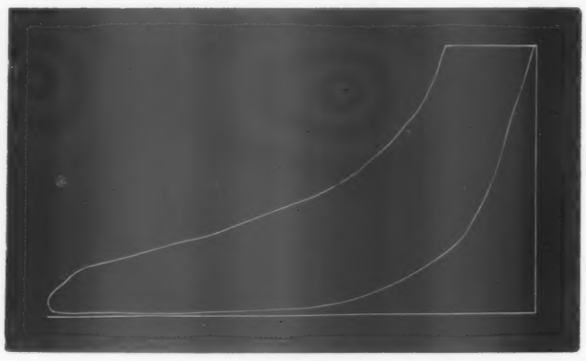

DIAGRAM NO. 5.

The massive frame and bed is a combination of the Porter-Allen box-girder bed with cross ribs, Prof. Sweet's straight line frame, and the original Corliss and girder frame, and has the excellent qualities of these combined. The base, or lower portion, forms a box girder with cross ribs. This girder is made of sufficient depth to pass under the crank disc, and extends straight the full length of the frame. The top side of this box forms the lower slide. The web of metal connecting the box-girder with the top plate is a straight line of metal connecting the cylinder with the main bearing, close to the crank disc.

The top plate is a curved girder, which is carried back the full pillow-block width. This construction makes a rigid frame that will not yield or spring, and all bearings will run cool when engine is running at a rapid speed and driving heavy loads with high steam pressure.

The cylinder is made from hard, close-grained, charcoal iron, same as is used in car wheels. It is cast without heads, and the forward head, with its stuffing-box, is held between cylinder and frame.

The cylinder is secured to end of frame, and overhangs. This construction insures a perfect alignment of the working parts at all times, as the cylinder is free at front end to expand when heated, and in so doing it does not put a strain on the engine frame or foundation, and cannot spring the frame and throw working parts out of line, the result of which is heating or breaking of parts.

Two important points are gained by placing the steam chest and valve below the cylinder. Only dry steam enters the cylinder from top of steam chest, and all water will pass off at opening in bottom of steam chest. The steam ports being on bottom side of cylinder, all condensation in cylinder passes directly out with the exhaust steam. No cylinder cocks are required.

The simple valve, entire valve gear and eccentric are shown in the cut. One turn of the handle on end of eccentric rod permits the unhooking of the rock-shaft, and the steam valve can be reversed by hand while steam can be admitted to warm the cylinder and steam chest before starting.

A correct valve motion is obtained by placing the valve below the cylinder and using a rock-shaft. In all engines the piston travels faster on the back end of the stroke, and by this arrangement of parts a valve travel is obtained proportionately equal to the piston travel through each part of the stroke. This is an important point, especially in high-speed automatic engines designed for heavy work, but is not infrequently neglected, although an engine will not give perfect or equal indicator cards from both ends of cylinder if the valve motion is not correct.

The piston is a single casting, hollow, and as light as consistent for strength. It has a long bearing in the cylinder, and is packed by two simple spring rings accurately fitted to the bore of cylinder. This kind of head and packing is simple and effective, and has been adopted by many of the best high-speed stationary and locomotive engine builders. The piston being cheaply and easily replaced is the weakest, and will break before a charge of water, and save the engine.

The steel piston rod is provided with large, deep box for packing, and the gland is lined with bronze. A large steam reservoir sur-

rounds the valve, encircling the lower half of the cylinder. The entire cylinder and steam chest is surrounded with two inches of wood, or asbestos, and covered with polished brass casing secured by German silver bands.

Fig. 4 shows a cross section of the bed through the slides. The rock-shaft is a steel casting, with the lower arm that drives the valve cast on. The shaft is supported on the steel. The connecting-rod to valve stem is steel, and fitted with a tempered steel bushing. By removing the bolts in flange the rock-shaft, with crank and connecting-rod, can be withdrawn through the opening in frame which is covered by flange.

Two steel projecting arms are cast on the cross-head, which carry the upper and lower slides. These arms are threaded, and carry on the ends a tapered steel sleeve or nut, guides and slides are very large, each being nearly one-fourth the circumference of the cylinder. This insures cool running and long service without adjustment. The pressure and wear is all on the lower slide, and besides the method of lubrication already given, there is a pocket, cast in the frame at each end of the guide, which is filled with oil, and the slide enters and is lubricated at each end of the stroke.

the eccentric is carried across the shaft. When the engine is running without a load the valve opens to admit steam at full boiler pressure exactly on the center, and closes before the piston has moved ½ inch. Steam is allowed to follow at full boiler pressure further and further as the load is increased. When the maximum load is reached the full throw of the valve is given, and in order to keep up the speed, steam is admitted at full

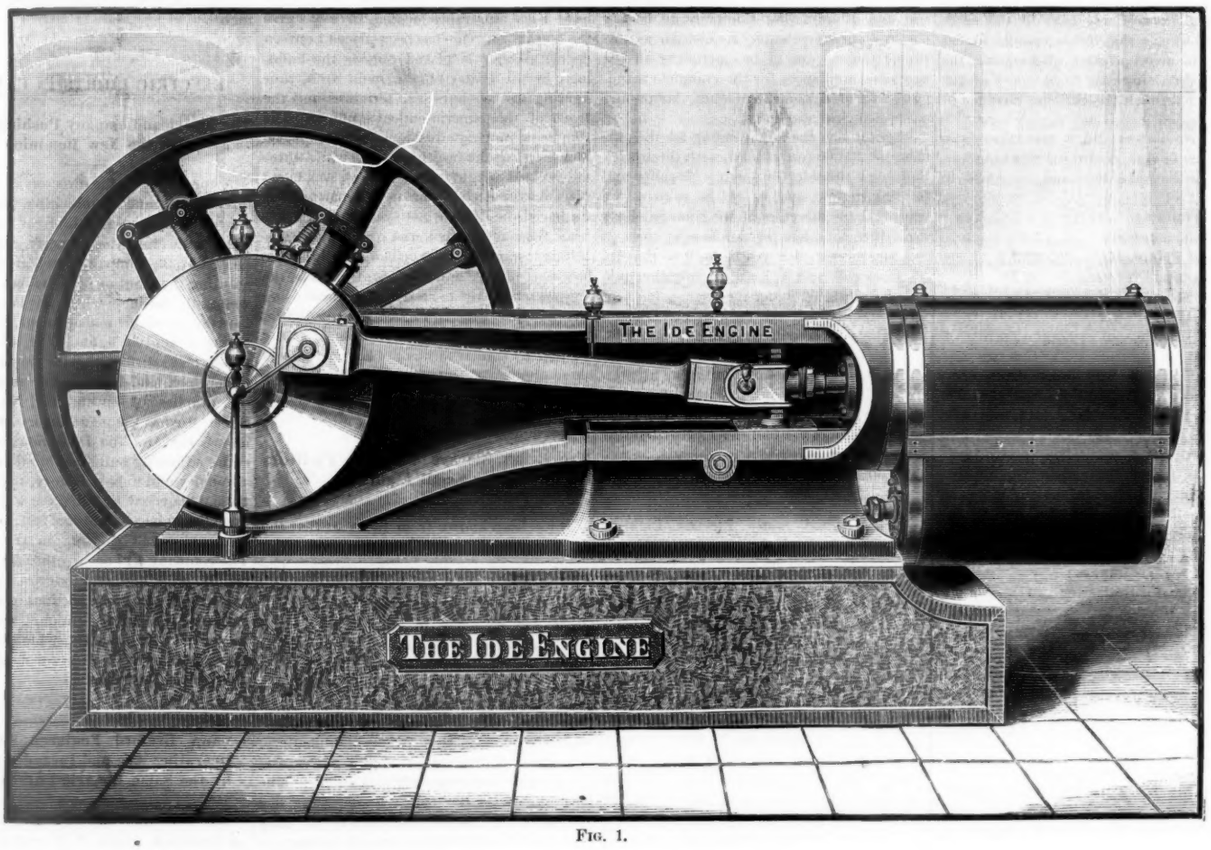

FIG. 1.

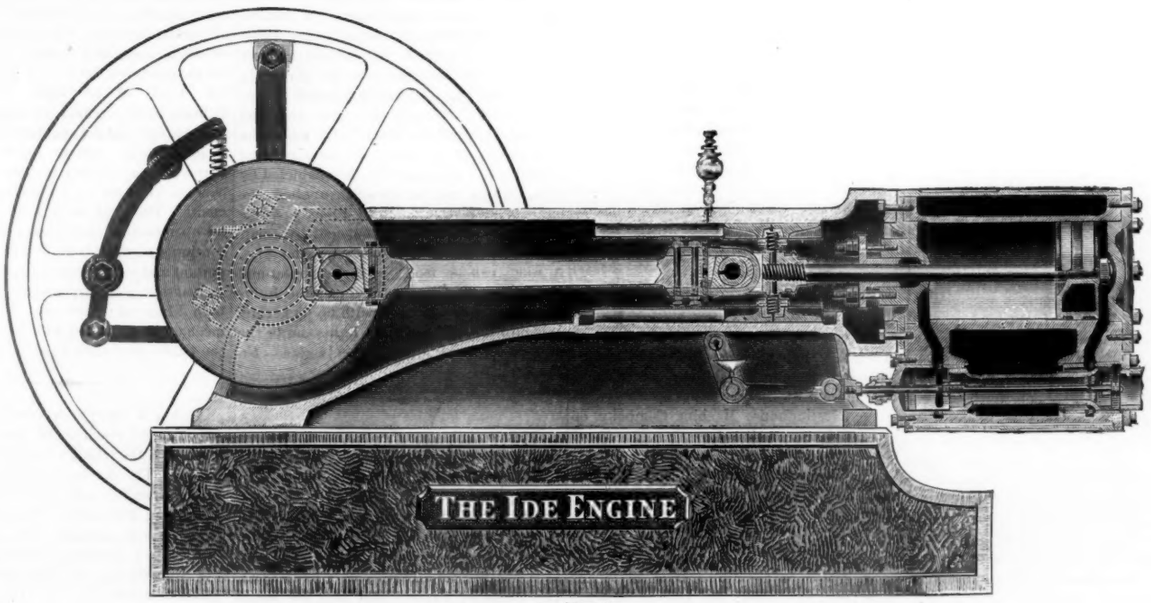

FIG. 2.

front end by passing through the front side of bed. The back end is carried by a flange bolted to the back side of the bed. This flange has a large sleeve with a bearing at the inner and outer ends, with an oil reservoir in the middle. The front end of the shaft is hollow, and contains a reservoir for oil which is filled through an opening in end of shaft. A tube from the oil reservoir carries the oil to the valve rod, crank-pin, which is hard which is threaded on the inside, and fitted with a taper on the outside which fits into the bosses on the slides. A steel jam-nut forced against this sleeve secures it in place, and adjustment can be made for the wear of the slides.

The guides are bored out the same diameter as the cylinder, and cannot, under any circumstance, get out of line with the cylinder. As will be seen, the wearing surfaces,

The automatic safety governor is shown in position in the fly-wheel (Fig. 5). The eccentric has a pocket projecting from the lower side, to which a steel arm is bolted. This arm is pivoted near the rim of wheel. Opposite this is a lug to which two steel arms are connected. These arms are connected to two bent steel levers, on which the fly weights are placed. As these arms move out into the position shown by the dotted lines

boiler pressure up to three-fourths of the stroke. The large ports allow a very large opening to be obtained with a small travel of the valve, giving full boiler pressure in the cylinder even at such high speed. The valve will close and cut off steam at a point that will just do the work and maintain the regular speed.

The card shown in diagram No. 1, was taken from a 12 by 18 Ide engine making 200

revolutions per minute, with brake on band wheel. It is a double card from one end, *i. e.*, load was first put on cutting off at ⅛ stroke, giving a mean effective pressure of 25 lbs.—51.25 horse-power The load was then increased, giving ⅛ stroke, and pencil held to card again, giving a mean effective pressure of 48.12 lbs.—98.64 horse-power.

Diagram No. 2 was taken from a 12 by 18 Ide engine making 200 revolutions per minute and brake applied to band wheel. The load was put on so as to carry steam nearly half stroke, when it was suddenly released while pencil was held to the card. This card shows the various points of cut off, and the nice operation of governor, the engine maintaining the fixed speed of 200 revolutions through the extreme changes of load.

The above diagram No. 3, was taken from a 12x18 Ide engine, making 200 revolutions per minute. Brake on band to wheel to make the load.

Data as follows:

Crosby Indicator Scale,	50	pounds.
Reading of Planimeter,	45.9	"
Mean Effective Pressure,	57.37	"
Initial Pressure,	73	"
Indicated Horse-Power,	117.60	"

Taking 10 inches of steam, or cutting off at ⅝ stroke.

Diagram No. 4 was taken from same engine under same conditions from the other end. They go to show the great power held in reserve.

Diagram No. 5 was taken from a 12x18 Ide engine in the Springfield, Ill., Electric Light Company's Station; engine was making 200 revolutions per minute, and driving four 20-light Fuller Company's Dynamos, or 80 arc lights of 2,600 candle-power each.

Data of card as follows:

Crosby Indicator Scale,	40	Pounds.
Reading of Planimeter,	27.2	"
Mean Effective Pressure,	27.2	"
Initial Pressure,	75	"
Indicated Horse-Power,	55.76	"

Taking 3 inches of steam, or cutting off at ⅛ stroke.

Rate of water consumption 22.91 pounds water 1 H. P. per hour.

Remarkable Work in Electric Lighting.

The American Electric and Illuminating Company having recently bought a factory in Montreal, Canada, and which is known as the Canada branch, is under the management of Mr. M. Lee Ross, a gentleman well known in electrical circles of New England for his energy, ability and his remarkable way of doing business with wonderful rapidity.

It will be remembered by our readers that Mr. Ross built the electric lighting station of the Wachusett Company in Fitchburg, Mass., a plant of 150 lights, within the short space of five weeks, remodeling and completing a building, with engines, boilers, shaftings and all necessary equipment put in proper shape, and run four circuits, aggregating twenty miles. After this work was completed, he became general manager of the Merchants' Electric Light and Power Company, of Boston. The latter company at that time had six circuits, aggregating about forty-five miles, and 550 lights in operation. The business of the company assumed such large proportions that he, in conjunction with the officers of the company, designed plans and laid out one of the largest electric lighting stations in the world, which will be opened in Boston some time during this month. Mr. Ross resigned the management of the Merchants' Company, upon the acquisition by the American Electric and Illuminating Company of the manufacturing business in Canada, and assumed the general management for the Dominion of Canada of the Boston Company.

Remarkable success has followed the management. Seeing the necessity of placing the American arc system before the public of Montreal, they commenced, on the 24th day of January, 1884, to build a 200-light station. A portion of the St. Lawrence Paint Works, which was used for coal storage, was rented, properly remodeled, shaftings, pulleys, etc., ordered, a five and a half mile circuit built, 101 arc lights placed in position, and within seven days from day of starting all was in full and complete operation. This, to the best of our knowledge, is the quickest work on record in electric lighting.

Mr. Ross received very valuable assistance and aid from Mr. H. E. Irvine, the treasurer of the company, who spent a few days in the city of Montreal, and, with several of the directors, inspected the factory, station and the companies' work, and passed upon the same with many congratulatory remarks to the management, and to the American Electric and Illuminating Company in having obtained such a valuable acquisition as this property turns out to be, including all the necessary appliances for the complete manufacturing of dynamo machines, lamps and other electrical apparatus.

Negotiations are now pending for the purchase of 13,000 feet of land, with three brick buildings, suitable for factory, foundry and lighting station; and, as we go to press, we learn that the directors of the company have decided to complete the purchase at once.

A 500-light station will be built in the city of Montreal, and a local organization perfected and placed under the management of well-known gentlemen in that city; also a 100-light station will be built at Point St. Charles, and run by the local company.

The company's factory is running at present to its fullest capacity, manufacturing plants already ordered; and, from the present demand, proves the fact that electric lighting is making rapid progress in Canada, as well as in other parts of the world.

"The United States Electric Lighting Company" have started a station at Davenport, Iowa. They are using the Armington & Sims engine and a tubular boiler, set with the Jarvis patent furnace, that was on exhibition at the Louisville Exposition. They use the Sheffield grate bars, and burn slack coal for fuel.

A company was organized on the 13th inst. for lighting Erie, Pa., by electricity. The capital stock is $100,000, in shares of $100 each, which is all subscribed except fifteen shares. W. L. Cleveland is president; J. F. Downing, vice-president; Charles C. Shirk, secretary and treasurer. Contracts have been signed with the Brush Company, of Cleveland, and the works will be in operation in thirty days.

An arrangement has been made between the Portland (Me.) Electric Light Company and the New England Weston Company, of Boston, by which the latter company assumes the business of the former in Portland. The local *Argus* says: "This puts the business into the hands of a strong company, which is thoroughly equipped and competent to enlarge the business extensively. It is proposed to pay especial attention to the Maxim incandescent system of interior lighting."

The Brush Electric Light Company, of Buffalo, are erecting a new station, with a capacity of 600 lights. It will be equipped with ten 60-light dynamos, driven by ten independent engines of 65-horse power each. The contract for the power has been awarded to the Westinghouse Machine Company, of Pittsburgh, Pa., their automatic engines having been adopted, after a competitive test extending over nearly a month. The dynamos will be belted direct, and no counter-shafting employed.

At a meeting of the directors of this company Boston on the 12th instant, dividends were voted as follows: The guaranteed semi-annual dividend of 4 per cent. on the preferred stock; an extra semi-annual dividend of 2 per cent. on the preferred stock; and a semi-annual dividend of 2 per cent. on the common stock. A 10 per cent. dividend, payable alike to the preferred and common stockholders, from the stock of subordinate companies now held in the treasury of this company, was discussed, and as two members of the Board were absent, further consideration was postponed until the next meeting.

Pavonia Ferry House Illuminated by the Baxter Electric Lamp.

The New York, Lake Erie, and Western Railroad Company have done away with the cause of frequent and merited complaint, by the introduction of six electric lights at the ferry buildings, at the foot of Pavonia avenue. The work was done under the direction of Lewis F. Lyne, M. E., who is now in charge of the Jersey City Electric Light Company's (as the rejuvenated Baxter company is now known) new construction work. The lights have been admirably located, so as to give the best effect. One has been placed between depot; another is placed outside the buildings, in the center of the main arch, thus lighting up the horse-car terminus and the front of the superintendent's office. The four remaining are inside, one being placed in center of the waiting-room, while three are utilized to light up the bridges; one being placed over each. The new departure has displaced the Pitsch gas system, which has been thoroughly tried, and found wanting—in this instance at least. The new lights are working nicely, and are nightly made the subject of approving comment by those using the popular Erie route. The probabilities are that the entire depot will be speedily lighted by similar means. There are also a large number of Fuller Electric lights using the Baxter attachments in Jersey City.

The Brush Storage Battery's Facilities for Small Lights.

It has been known from the start that the large powerful electric lights were not at all times suitable for inside illumination. The efforts of the companies have for some time been directed to the perfection of small lights, to be made to burn steadily, and easily adjusted in the inside of houses, the electricity for running them to be stored in batteries on the premises of the customers. One of these batteries has been working at the office of the company in this city since the 8th inst. It is a twenty-light battery, each light of five or six candle power, and is charged from wires of the main line. The manipulator of the battery is something like a gas-meter. When the battery is fully charged the manipulator closes against the wire, and the stock of electricity will burn twenty lights for four hours. A smaller number of lights will run a longer time. They are all lighted by turning a small crank. These batteries can be placed in dwellings or other houses in a small space, connected with wires of the main line, and charged daily, or less frequently, when the total amount of electricity is not consumed each day. The electricity is conducted by wire, which can be cheaply supplied, the lights being placed about the room, just like gas. The wires can be covered by small strips of wood, with grooves for the wire. A room can be made to look as neat and elegant as one supplied by gas, the lights being steady and reliable, with no flickering. It is now thought that these lights can be run at a lower price than gas.—*Cleveland Exchange.*

W. H. Preece recently gave, at the Institution of Civil Engineers, some interesting information on the subject of wire conductors for electrical purposes. Copper is, he said, almost universally used for insulated conductors, and the manufacture has been so much improved that it is now twice as good as it was in 1856. Copper wire has a breaking strain of twenty-eight tons per square inch, while iron wire breaks with twenty-two tons. The best copper comes from Japan, Chili, Australia and Lake Superior, but a great deal of pure copper is obtainable by electro deposition. The ordinary best puddled iron is at present used only for fencing purposes, but a mild English Bessemer steel is largely used for railway telegraphs and for stays, although the resistance is very high, owing to the presence of manganese. The wire used by the Post-Office is made from Swedish charcoal iron. Swedish Bessemer, or a specially prepared low carbon English Bessemer, is adopted by the Indian Government. Cast-steel wire, with a breaking weight of about eighty tons to the square inch, has been adopted on the Continent for telephone currents; while in England, where speed of working is the prime consideration, electricians are satisfied with a breaking strain of twenty two tons on the square inch. In the colonies, where long spans are essential and speed of working is not so important, the specification is thirty tons on the square inch.

ELECTRIC LIGHTS IN CANADA.

The American Company Pushing Business in the New Dominion.

A committee of the directors of the American Electric and Illuminating Company of Boston has been in Montreal during the week inspecting the property recently purchased by the company here, and now constituting the plant of its Canadian branch, as well as the business which has been built up here by energetic management, now aggregating over 100 lights. The directors express great satisfaction with the purchase and the outlook, and have to-day ratified a further purchase of the building, No. 32 Dowd Street, used as the manufactory of dynamos, lamps, etc., for the Dominion; also of the entire adjoining buildings, used at present as a foundry and a box factory, together with the land covered by all three buildings, aggregating thirteen thousand feet; also the boilers, engine and shafting in the buildings. The company will occupy the entire premises for its large and rapidly-growing business, and will rebuild some portions of the present structure and build additional new ones, so as to utilize the property, which is located in the very heart of the city, for manufacturing and lighting purposes.

A New Bedford Engineer Succeeds in Operating Arc and Incandescent Lights by the Same Electric Current.

Mr. Adoniram Negus, engineer, has made an invention which, if it proves to be practicable for general use, will be one of the most important yet recorded in the history of electric lighting. By a kind of modifying switch he is enabled to attach a branch wire for incandescent lights to a Thomson-Houston circuit of arc light wires. It has hitherto been deemed an impossibility to operate arc and incandescent lights by the same electric current, and Mr. Negus burned up a number of slips of Edison's bamboo charcoal in his preliminary experiments. The light has now been in successful operation for more than a week; and if it continues to work well, it will be a very important and useful invention, as there will be a great saving of wires and of dynamos where both kinds of lights are called for. The mechanism employed will be kept away from the public gaze until a patent is obtained.

Ayrton & Perry's electrical tricycle is an open-fronted machine, of the ordinary pattern, with the treadles and driving gear removed. The driving wheel is 44 inches in diameter, and close to it is a large spur-wheel containing 248 teeth. The motor is slung from the seat platform. The armature spindle carries a spindle of 12 teeth, gearing into the spur-wheel, the machine being thus speeded down 20 to 1. The battery, composed of Faure, Sellon-Volkmar cells, occasionally, and sometimes of a combination of the two devices, is slung from the backbone and axle, and when fully charged contains a store of electrical energy equal to the conventional two-horse power.

Keely announces that his motor will be ready to run "at an early day." We suggest the 30th of February.

TELEGRAPHIC

The New England Telegraph and Telephone Company is extending wires between Boston and New York. They follow the present lines from Providence to Westerly. They are using a copper wire on this line.

HARRISBURG, PA.—A charter was granted on the 14th instant to the Postal Telegraph and Cable Company, of Philadelphia; capital, $20,000. The line is to run from Limestone, N. Y, to a point in Hanover township, Washington county, Pa.

George G. Ward, who has been the manager in this city of the Direct Cable Company since it opened for business in 1874, and also manager of the French Cable Company for several years, has resigned those places to become general manager of the Bennett-Mackay Cable Company.

During the six months in which the battle of Tel-el-Kebir was fought, the receipts of the telegraph company, which forwarded press dispatches to London, was $290,000 more than in the half year that followed. This fact is cited as an illustration of the extraordinary development of newspaper enterprise.

Mr. W. E. Huntington, general manager of the Mexican Central Telephone Company, has resigned to take charge as general superintendent of the district messenger department of the Baltimore and Ohio Telegraph Company, and we venture to say that it would be hard to find a gentleman of more experience and as well qualified to fill this particular position. We wish him the success he deserves.

Telegraph Stock Purchased.

NEW YORK, Feb. 8.—The Baltimore and Ohio Telegraph Company has to-day, through its President, Robert Garrett, concluded the purchase of the entire capital stock of the Manhattan District Telegraph company at a price somewhat less than par, $100,000.

Articles of incorporation of the Gilliland Manufacturing Company, Indianapolis, have just been filed with the Secretary of State of Indiana. The capital stock is $200,000. The directors are: Noah H. Swayne, Jr., Frank B. Swayne, William Kleine, Charles W. Hammond, Charles Selden, John M. Wheeler, T. F. Sheldon, Schuyler C. Schenck, Ernest Helgendorf, William B. Clark, and James F. Gilliland. The latter is manager of the company.

Ten Trans-Atlantic Cables.

The first cable, built by the Atlantic Telegraph Company from Ireland to Newfoundland, was completed on Aug. 5, 1858. The second was commenced in 1865, by the Anglo-American Telegraph Company, but it broke when half laid, and was not picked up and completed from Ireland to Newfoundland until the Fall of 1866. The third was laid by the same company between the same points, and was also completed in 1866. The fourth was laid by the Societe du Cable Transatlantique, and was completed in 1869 from Brest to St. Pierre and Duxbury. The fifth was laid by the Anglo-American Telegraph Company from Ireland to Newfoundland, and was finished in 1873. The sixth was laid between the same points by the same company, and was finished in 1874. The seventh was laid by the Direct United States Cable Company, and was finished in 1875 The eighth was laid by the Campagnie Francaise du Cable Transatlantique, and was completed in 1879 The ninth and tenth were laid by the American Telegraph and Cable Company, and were finished in 1881 and 1882.

Buying Telegraph Lines.

BALTIMORE AND OHIO ABSORBS THE MANHATTAN DISTRICT COMPANY—ITS SOUTHWESTERN LINES.

The Baltimore and Ohio Railroad Company, which some days ago purchased the lines of the National Telegraph Company along the West Shore and Nickel Plate Railroads, has now bought the entire capital stock of the Manhattan District Telegraph at a price something less than $100,000.

The Manhattan's Company's offices will be opened at once to the wires of the Baltimore and Ohio Telegraph Company. Mr. D. H. Bates, the president of the Baltimore and Ohio Telegraph Company, will assume the presidency of the Manhattan District Telegraph Company.

Arrangements have been concluded to form a company to be operated in connection with the Baltimore and Ohio system, which will cover the territory south of St. Louis, through Missouri, Arkansas, Louisiana, and Texas to New Orleans, Galveston, and intermediate points. This extension will reach a part of the country where competition in telegraph business has never yet been known, excepting at New Orleans. The services of an experienced superintendent now in the employ of the Western Union Company have been secured to take charge of this addition. Telegraph building can be carried on in the South during the winter, and President Bates says he expects to have the necessary links completed and in operation within ninety days.

More Wires for the New Telegraph Company.

It is understood that the Philadelphia, Reading and Pottsville Telegraph Company has made a contract with the Western Union Telegraph Company which can be terminated within sixty days. The wires controlled by the former company, which is a part of the Philadelphia and Reading Railroad system, and which also controls those along the Jersey Central Railroad, are nearly 2,000 miles in length. These are all, it is stated, to be worked in connection with the Baltimore and Ohio Telegraph Company, and will give that corporation telegraphic entrance into the most important sections of the anthracite regions.

The Bennett-Mackay Cable.

Mr. George G. Ward, for the past ten years general superintendent in this country for the Direct United States and the French Cable companies, has resigned his position, and will hereafter be connected with the Bennett-Mackay Commercial Cable Company. Mr. James Brown, who came from London nearly nine years ago as Mr. Ward's assistant, has been appointed general superintendent to fill the vacancy. Mr. Ward will soon open an office in this city for the new company. The steamer Faraday is already on her voyage to lay the first 1,000 miles of cable, and by next fall it is expected that two cables between Ireland and Nova Scotia, one between France and England, and another between Nova Scotia and Cape Ann, Mass., will be in operation. Mr. Ward says that the new cable company will connect exclusively with the Postal Telegraph Company, of which Mr. J. W. Mackay is president.

Mr. A. DeC. Solamon, superintendent western department American District Telegraph Company, has joined the Baltimore and Ohio ranks, and will supervise the Manhattan District, western department, from February 15.

"I bought some stock in the —— railroad," said a member of the Old Guard, yesterday, "because my broker said it was a good buy." "And wasn't it?" "Yes," replied Mr. Eastman, "good-bye to my money.."

The Fiftieth Anniversary of the Telegraph of Gauss and Weber.

Our esteemed contemporary, *Engineering*, says that in their issue of December 21 they called attention to the fact that the lucifer match was probably just fifty years old. According to some of our German contemporaries another and far more important fiftieth anniversary ought to have been celebrated in the year 1883—that of the telegraph of Gauss and Weber, at Gottingen. It must not, however, be understood that they wish to ignore the claims of the many men of all nations who before Gauss and Weber had occupied themselves with electric telegraphy. There is perhaps hardly a branch of practical science which would offer more difficulty to the assiduous investigator of priorities than that of telegraphy; and if we confine ourselves to magnetic and electric telegraphy we shall find that there have been few electricians who have not worked in this direction. We may at any rate go back to the year 1553, when J. B. Porta, of Naples, in his "Libri Quatuor Magiæ Naturalis" spoke of the sympathetic and synchronous oscillations of two magnets, the one of which was secondarily excited by the other stationed at a distance. That no magnet would operate at a distance greater than 3 feet was soon proved by Dr. de Boodt, of Bruges, amongst others. Yet many wrote about a magnetic telegraph; we are well acquainted with the ideas of the Jesuit Famiano Straña, of Rome, 1617, because Addison translated his remarkable verses in the *Spectator* of 1721. The synchronous play of two needles far apart was to many satisfactorily explained by the belief in some mystic power, even in the later days of the eighteenth century, when frictional electric apparatus for telegraphic purposes of manifold forms had been devised. The first of this kind probably originated from C. M.—to all appearance Charles Marshall, of Paisley, then at Renfrew—who in *Scot's Magazine* of February, 1753, explained how a number of wires, one for each letter, stretched with metal balls at their ends, would attract paper discs to these balls if electrified at the other end with the help of an electric machine. C. M., who evidently fully understood what he said, also thought of bell signals. Lomond, in 1784, found in his alphabet of motions means to reduce the number of wires to one only. Reusser (1794) watched directly the sparks; and Ronalds (1816), at Hammersmith, experimented both on an aerial line of eight miles on poles, and a cable with shellac and silk in a glass tube lying in a trough insulated with pitch. But something practical could only be achieved by voltaic currents, which we may remind our readers were observed by Georg Sulzer before Galvani's wife wanted her frog broth. Volta himself had his ideas. Soemmering, afterwards joined by Schilling, based his system (1809) on the electrolysis of water; Westbrook and Rogers, in America, on the electrolytic decomposition of metallic salts. Oersted's discovery of the deflection by the electric current of the magnetic needle in 1819 opened an altogether new path; it at once suggested a needle telegraph to Laplace, who communicated his ideas to Ampère. But although V. T. de Saint Armand contemplated a cable of Ronalds' type (1828) between Paris and Bruxelles, practically nothing was done before Gauss and Weber, at Easter, 1833, joined the physical cabinet and the observatory by a wire 8,000 ft. long, leading up to the steeple of St. John's. Gauss, worked with his magnetometer, constructed a commutator, and thought it more reliable to trust the eye in watching the needle, than the ear listening to the needle striking against a bell. Weber principally wanted to have electric railway signals, and depending upon Gauss's calculations that the earth was a conductor a million times inferior to iron, he thought of using the rails as conductors, whilst Gauss seeing the difficulty of preventing short circuiting by means of the wheels and axles, only wished to employ the rails as return wires. The electric signals were first tried by the Leipzig-Dresden Railway, but soon given up as too expensive. The practical development of the electric telegraph finally came from England, mainly through Wheatstone's efforts. The history of telegraphy since Gauss and Weber belongs to our days.

Gauss lived long enough to see his hopes, bold as they may have appeared, fully realised; and Professor Weber has been spared to receive congratulations on this fiftieth anniversary, in which we may heartily join, as science does not know many better names than those of Gauss and Weber. Perhaps neither of them ever dreamed of 170,000,000 telegraphic messages a year, and wires that would encircle the equator fifty times, or form a fivefold cable rope to the moon.

The Postal Telegraph Scheme.

MR. EVARTS' ARGUMENT AGAINST IT BEFORE THE SENATE COMMITTEE.

WASHINGTON. — The Hon. Wm. M. Evarts, representing the Western Union Telegraph Company, made an argument before the Senate Committee on Post Offices and Post Roads to-day, in opposition to the establishment of a postal telegraph system. He said that should either of the three bills now before Congress to-morrow become a law, the problem of Government control of the telegraph would not be solved. Neither measure undertook to provide for the long interim of time that must elapse before there was a Government service, and all that time there was a situation which disorganized the private systems. The Edmunds bill he said, provided for a governmental system without disturbing the private lines. It authorized the Government to take patents and everything but lines. To the suggestion, "Why not buy the lines? You take everything else," Mr. Edmunds had said there was no tribunal that he would trust to do justice between the United States on the one hand and the Western Union on the other. Well, if justice could not be done, did it follow that injustice should be done? He would agree that the price would be larger fixed on the principles of justice than it would be if it was fixed on the principles of force.

The Dawes bill created a monopoly secured by law. Besides its exclusive franchises in the occupation and use of public property at a comparatively nominal sum, it was to have the right and the power to aggregate into its possession and for its profit the entire business of telegraphing. It was to be limited to eight per cent. on its stock, and after that its earnings were to go to the increase of its property or the reduction of rates, at the option of the company. What more had the Western Union in the feature of monopoly than this? And every impulse to perform the service to the best advantage of its patrons was here to be stricken down.

Senator Hill's bill was a gradual encroachment upon the telegraph interests, like the encroachment of the bear upon Munchausen. It admitted that at least some equitable arrangement should be made with the telegraph interests if the Government interfered in the matter at all. The Government, Mr. Evarts said, had no right of eminent domain in the States. The war power did not confer the right to say that a citizen held his property at too high a price, and the Government might, therefore, take it at a valuation established by arbitration. It could acquire no property for Government control except by consent of the States. When it came to administration, if the Government actually carried on the telegraph, the people would not have the least confidence in it. Private lines would be started on important routes where a contract could be made, and recourse could be had to damages for violation.

"My poor man," said the doctor, "you are dangerously ill. Is there any word you want to send to your friends?" "Am I really so ill?" asked the sufferer. "Alas! I can offer you no hope." "Very well, then," said the sick man, "just telephone for another doctor." T. B. D.—*Old Guard.*

Telephonic News

As the Bell Telephone stock is now back to 174½, and rising rapidly, the people who sold out at 145 on the Drawbaugh "scare" are not a little weary over their rashness.

New England telephone is steady. The net increase of telephones in Boston last month was 92. The increase in Boston and in the suburban territory will be about 150.

One advantage of the long-distance telephone will be that the reporters on the American dailies can tell the English authorities at once how to manage matters in Egypt instead of waiting for the slow process of sending a paper over, marked with a blue pencil.

Telephonic communication between moving vessels has been successfully accomplished in France. *Engineering* says. As one vessel was towing the other the wire was carried along one of the hawsers, and the circuit was completed through the copper on the bottom of the ships and the water. Conversation was carried on distinctly.

Mr. I. H. Farnham, superintendent of the Portland Telephone Company, has invented, and now has in successful operation at the *Transcript* office, an electrical alarm attachment for presses and folders. It instantaneously notifies the pressman should papers clog anywhere in the gearing, or if any undue interval should elapse in the passage of sheets. As arranged in the *Transcript* office, it is a clock-work attachment to each of the patent folders, at points where the papers are delivered, from which wires converge to a cell battery and gong nearly over the press. The advantages of such a device in connection with rapidly driven machinery, such as printing presses, is very obvious.

A New View of the Telephone.

The other day in St. Louis some Apache chiefs, who had been carried there, were shown a telephone and permitted to hear through it a mysterious voice spoken from afar. They marveled exceedingly over it. They were the leaders of the most implacable of savage tribes. Their hands had often been wet with the blood of murdered men and women; war whoops of their tribe were as familiar to their ears as the cry of the wild wolf; but that intangible small voice which came to their ears from the infinite, that was a new experience to them. One by one they listened to it; then, in silence, wrapping their blankets around them, went and sat down to think. After a while their tongues were loosened and each gave his idea of what the voice in the telephone was. The final conclusion was that it was the white man's Great Spirit, as he talked in English, and the anxiety was to find the instrument through which the Indian's Great Spirit spoke to his children.

The Erie Telegraph & Telephone Company had 7,802 subscribers Dec. 1, 1883, a net gain of 271 over Nov. 1. In December there were added 106 subscribers in the Northwestern division, and 220 in the Southwestern division, and 50 in the Cleveland exchange, a total of 376. There were taken out 145, leaving a net gain for December of 231, and making a total of telephone subscribers in this company Jan. 1, 1884, of 8,033, of which 2,720 were in the Northwest division, 3,690 in the Southwest division, and 1,623 at Cleveland. The number of telephone subscribers in some of the largest exchanges Jan. 1, 1883, may be of interest. St. Paul had 595, Minneapolis 868, and Fargo 187. In the Southwest, Little Rock had 297, San Antonio, 396, Dallas 302, Galveston 366, and Austin 141. Of the twenty-one exchanges in the Northwest division, only five have 100 or more subscribers; and of the thirty-three exchanges in the Southwest division, twelve have 100 or more subscibers

WASHINGTON, D. C., Feb. 9, 1884.—The Secretary of the Interior has dismissed the appeal of Adolph Eccard from the decision of the Commissioner of Patents in the patent interference case of Eccard *vs.* Drawbaugh, in an application for a patent for a microphonic telephone. The interference had been decided in favor of Eccard, but the Commissioner granted Drawbaugh's motion to reopen the case for the introduction of fresh testimony, and from that decision Eccard appealed. The Secretary, in his decision, says that the evidence offered by Drawbaugh could have been readily produced at the date of the hearing, and that the rules of law would justify a refusal to order one hearing. But it would be manifestly improper to follow such rules if they led to the issue of a patent of doubtful validity, and, as the evidence offered is clear and positive, which, if sustained, would change the result of the interference, the Secretary holds that a patent should not issue to Eccard without further examination.

South American Telephone Business.

The agent of the Tropical American Telephone Company at Buenos Ayres writes, under date of January 3, that the December receipts of the United Telephone Company were $10,658.70, and the expenses, $8,893.71. The present subscription list numbers a little over 1,200. Sales promise to be larger this month than any previous one. They amount to $5,382; gained 52 subscribers in December. Advices from Rio de Janeiro state that the Companhia des Telegraphos Urbanos has the following exchanges working:

Rio de Janeiro, with 822 subscribers; Nictheroy, opp., with 43 subscribers; Petropolis (connected by cable), 27 subscribers; San Paulo, with 110 subscribers; Companos, just opened, 8 subscribers; total, 1,005 subscribers.

The company is in treaty for the establishment of exchanges in four other large cities, under a guarantee of 600 subscribers at the start. The latter half of 1883 was a period of unusual activity in telephone affairs in Brazil, but in 1884 has opened with still better prospects. Both of the above companies are sub-companies of the Tropical, in which the Tropical has a stock interest, beside sending them about 150 sets of instruments per month.

Telephones as Watchmen's Tell-Tales.

"Farmers and Mechanics' Bank O. K.," "Centennial Bank O. K." These messages, and announcements of a similar character from nearly every bank in the city of Philadelphia came rushing into the telephone exchange at Fourth and Chestnut Streets last night at 10 o'clock, and for a few minutes the operators were kept busy receiving word from the watchmen who are locked up in the big financial institutions as to the condition of affairs behind the granite and iron walls.

As an additional police precaution against robbery, fire or accident, during the past few years nearly every bank, large banking house, and several prominent business establishments have had their places connected by telephone with the exchange. Beginning at 7 o'clock in the evening and ending at 6 in the morning, the watchmen of these institutions communicate half-hourly with the operator at the exchange. At the appointed time, in case there is no report from a particular place, a man is sent to the bank or mercantile house to ascertain the cause for the failure. If the watchman does not answer the messenger, then the authorities are communicated with and the bank is opened. A failure to report is also marked on the slip in the exchange, and word is sent to the bank or mercantile house the next morning. This new method of policing has become popular.

Dr. Richardson, of England, says that "when the air is driest, the drinker craves alcohol the most." This may be the case in England, but in the experience of the *Old Guard*, in this country, it is when the drinker is the driest he craves alcohol the most.

Lynn, Mass., Telephone Service—Changes to be Introduced.

The increase in the telephone business in this city is a little phenomenal, and ever since its inception improvements have been constantly made. To-morrow all the present telephone boards will be removed. Manager Hubon, of the Lynn Exchange, recently initiated us into the mysteries of seven new Western electric boards, which are to supersede the old. The Western Electric board is much simpler than the present one, and one operator can answer calls one half as fast again. This change has improved service greatly.

The new boards are so arranged that when a call is made the parties are at once connected, so that as soon as the party desired answers, they will be in direct connection with the party first called. This will save much time and bother to the operator and work to the advantage of the telephone service.

There will be a lady operator to each table, but in case of emergency one operator can attend three, as there are only thirty-five wires coming to a table. The talking across the board will also be done away with, for if a party on "A" board wants a party on "B" "C" or "D" board, the operator opens a circuit with the operator of the board wanted, and speaks to her through the transmitter. In case one operator is very busy, and the operator beside her is not, she can render assistance without interference.

A new transmitter will be used, which will allow the operator to talk low, so that she can be distinctly heard on the wire, but the usual "hum" in the office will be done away with. There are five Lynn lady operators, and Monday two new ones from the Lowell division will commence operations in the Lynn office. The lady operators are courteous to all, and they have their division by heart. It is no small task to memorize every subscriber and their number, but they do it. At present there are about 300 subscribers, and 80 of them have private lines. The new boards will do service for 800 subscribers, and when they are in full operation Lynn will be better served than any other place in the State except, perhaps, Boston and city of Worcester.

The Brownsville, Texas, News.

Our Brownsville correspondent says that some of their city "mashers" and their respective "flames" are gradually ruining a number of telephone wires, by the enormous amount of "taffy" that they, by means of the telephone exchange, transmit back and forth to each other. There is no wire, cable, railroad iron, or anything else—except a "dude's" ear—in this world that can stand the terrific pressure of conveying many such messages as, "Talk louder, dearie," "Why didn't you come last night?" "You didn't go to see any other girl, did you?" &c. In some instances, we are informed, the wires are glued together at the central office by the refuse "taffy" that accidentally escapes and "boils over" at the place where the wires meet, and some of them have to be replaced every day or two in order to keep the machine going. "Taffy," electricity, and sound won't run together. Electricity purifies the atmosphere, inhabits telegraph wires, and the carcase of an amateur performer in an editor's office, when the criticism of the last performance did not do him or her justice. "Taffy," on the contrary, is an unhealthy diet, and invariably (*sometimes* we should have said) produces heart disease, sleeplessness, and occasionally lands both parties safely in the tomb of matrimony; and the fact that his mouth is always charged with such an enormous quantity of this seductive article is the reason why the growth on the "masher's" upper lip looks so sickly and withered when exposed to the bright light of noonday sun. In conclusion, we will state, to avoid misunderstanding and being knocked down and abused by mistake, that all parties displeased with the nature of this item will oblige the editor by applying to the War Department branch of the paper for redress, and not to him in person.

The People's Telephone Company.

It seems that the interest in the Drawbaugh telephone claims is fast fading, but a few facts regarding the financial status of the People's Telephone Company, claiming to own Drawbaugh's inventions, may still be of interest. The People's Company was organized, under the laws of the State of New York, with a capital of $5,000,000, which was issued to three persons for patents and claims to patents. The company at first owned patents of Klemn and Tisdell, and the suit brought by the Bell Telephone Company three years ago was defended upon other grounds than Drawbaugh's inventions. The present injunction stands against the People's Telephone Company, and does not affect any of Drawbaugh's alleged rights. It is understood that the Hebrews, to whom the stock was issued, pooled 67,000 shares of the 100,000 shares with a New York trust company. They then set to work to force the Bell Telephone Company to purchase this controlling block of stock at an enormous figure, and an office was opened in Boston, near the Bell Telephone Company so that a transfer of all the assets could be readily made for the expected cash. But the Bell Company refused to negotiate. As the People's Company was at large expense to maintain a standing in the courts, it issued three contracts, selling out all the territory of the company for cash and a stock interest. One contract was for the New England States, and upon this the New England company was formed, with a capital of $5,000,000. It is said that "four Western States were given to one director, and the balance of the United States made over to what was called the New York syndicate through a son of one of the directors in New York." These contracts licensed exclusively all the property owned by the People's Company, or hereafter to be acquired by it, to the several parties on a royalty basis of $7.50 per set of telephones and one-fifth of the capital stock of the sub-companies.

The New England company paid about $50,000 cash for its rights, of which it is said that only one-half reached the treasury of the company. The four Western States netted the company about the same amount, and the New York syndicate controlling the balance of the territory of the United States agreed to pay some $200,000 for its contract. The actions of this syndicate are something of a mystery yet to be fathomed. This syndicate owns the territory for which the Drawbaugh Telegraph and Telephone was organized with a capital of $15,000,000. It is said that $10,000,000 of its stock goes to the syndicate for its rights. The public are invited to buy the balance at $15 per share, and in the advertisement offering a "limited amount" of this stock for sale, the names of eleven directors are printed as "the directors of the company." It is said, however, that there are upwards of twenty directors, and that only the prominent names are put forward.

All the efforts of the company to sell out to the Bell Telephone Company proving unavailing, the promotors made a great stir over the pending lawsuit, and, after having sold all the territory to the three organizations above mentioned, they offered the 67,000 shares of stock at a "low" price to the Bell Telephone people. They negotiated through a prominent Boston firm and offered the whole block of shares for about $1,000,000. This they thought a very modest price. What the Bell Telephone people thought is not known, further than may be judged by their action in refusing to negotiate with a company that had nothing to sell.

Mr. Theodore Torrey, formerly of the old Western Union Telephone department, and more recently of the London and Globe Telephone Maintenance Company, we understand, will now represent the Utica Fire Alarm Telegraph Manufacturing Company, of Utica, N. Y. Mr. Torrey is an energetic, lively gentleman, and will soon be heard from in this field, as his acquaintance is extensive.

Telephone Call-Box.

Messrs. J M. Oram, Henry Garrett, and H. M Sutton, of Dallas, Texas, have patented a valuable improvement in the telephone call-box.

Some inconveniences arise occasionally in operating the present boxes from the liability of the hook to fail in making the proper contact, after the phone has been removed, by which means the circuit is broken and conversation interrupted. Negligence also often causes subscribers to fail to "ring off" when they have finished talking, in which case much valuable time is lost to the operator in the central office in the effort to ascertain the fact. The machinery of button and crank is cumbersome, requiring two hands to "ring up" the office and to "ring off." The inventors claim that all these difficulties have been removed in their box.

There is no hook with balance springs to get out of adjustment, make poor connections, or corrode. The lever which does all the work is moved directly by hand, thus dispensing with the balance spring and consequent inconveniences.

The mere removal of the hand phone "rings up" the office, and the act of replacing it "rings off." The office is thereupon immediately informed when the party desired has been found, and also when the business in hand has been finished. It is difficult to estimate how much time will thus be saved to the operators in large exchanges by these two simple improvements. Here is one element of great value in this invention which practical men will appreciate: Every performance of the box is positive as being directly under the control of the operator.

The construction is as simple as that of any other bell, and as inexpensive.

In addition to the ordinary style of box, the patent also covers several modifications, with ingenious contrivances for adapting the improvements to boxes already in use, whether operated by push buttons, cranks, hooks, or otherwise. The elements which are new and covered by the patent may be summarized as follows:

1. In a telephone call-box the combination of a lever with arms attached, anvils, and a generator operated by the movement of the lever, and circuit connections.

2. The combination with the switch-anvil, of a switch, a movable support for the telephone receiver attached to the switch, and a guard for preventing the receiver from being removed from its support until the switch has been adjusted to the magneto call-terminals, the said telephone support having a range of movement from its normal position for receiving calls; first, down below the guard, to send a call and permit the dislodgment of the telephone, and then a movement to the opposite side of its normal position, to make connection with the battery telephone and transmitter.

3. The combination with the switch-anvils of a switch, a telephone receiver, support attached thereto for movement in unison therewith, a guard for preventing dislodgment of the receiver until its support is moved, and a magneto-generator connected to and arranged to be operated by the movement of the telephone receiver support, when said receiver is dislodged from its support.

4. A slotted piece in connection with the lever and receiver of the circuit connections.

The Hartford Telephone Exchange.

ITS GROWTH—OVER 800 TELEPHONES IN HARTFORD—HOW THE IMPATIENT WASTE THEIR ENERGY—DON'T TURN THE CRANK SO MUCH—AN ABUSE TO BE REMEDIED.

A call at the Hartford Telephone Exchange recently surprised us at the improvements which have been made in the operating room since the office was first opened, about five years ago. Then it was all noise and, to an outsider, apparent confusion. The constant ringing of the gongs, and the shouts of hello! hello! hello! were almost deafening. Now, the thing has been so much improved that the operating room is as quiet as a house parlor, and though a dozen females were busily engaged in answering the calls, there was no confusion.

AT THE BEGINNING.

The first telegraph exchange established in the world was at New Haven, the sixth anniversary of which was celebrated in that city last week. The Hartford exchange was established about one year later, and its growth has been steady from the start. There are in this city now 806 telephones, in as many houses and offices, covering more than 800 miles of ground. Of this number of subscribers, one hundred and fifty have single wires at their command, so that they can get immediate service at any hour of the day or night.

ITS GROWTH.

In Connecticut there are thirty-six telephone exchanges, reaching two hundred towns and villages, and operating more than six thousand telephones, and it is safe to say that in two years every hamlet in the State can be reached by the telephone. In the Hartford exchange there are fifteen towns, while in some of the exchanges there are only three or four towns. In the Hartford exchange there are twenty-two employes, including fifteen girls in the operating room. Mr. George H. Coe is manager of the exchange; Daniel E. Smith, chief operator, and W. P. Frost, superintendent of construction. Under the improvements which have been made and the perfect system which has been established the telephone service is quite satisfactory, and in marked contrast to the time when most of the subscribers resolved themselves into a committee of grumblers and said hard things about it.

IN THE OPERATING ROOM.

As we said at the start, one is impressed with the order, the quietude and manifest system to be noted in the operating room. There, seated in a row, are a dozen girls, each with an annunciator board and an operating table before her. To each of these boards are attached twenty-five wires, and each accommodates about one hundred telephones. Of course each wire commands an annunciator, and thus each operator has twenty-five of these to watch. A call to the central office drops an annunciator noiselessly before the eyes of the operator. She answers immediately if there is only one down to be attended to. Sometimes half a dozen drop almost at the same instant on the same board. Now the operator has got to be lively or the waiting persons will become impatient and possibly drop remarks uncomplimentary to the telephone, and perhaps blame the operator for not answering sooner. At intervals there is silence along the whole line, but in a twinkling fifty annunciators may fall, and the whole force jumps into work again. Although each girl is answering the call at the same moment, and while near enough to almost touch elbows, neither disturbs the other. They place their faces quite close to the transmitters and just lift their voices above a whisper and the work is done. Then they quickly pass along to the next who is waiting, and then the next and so on. When a man in calling the central office becomes impatient at a minute's delay he should remember that the operator may have half a dozen simultaneous calls, and that she cannot answer all of them at once.

SOMETHING WORTH KNOWING.

It frequently happens if a call for the central office is not speedily answered, the impatient man seizes the crank and whirls it round most violently about a hundred times, and when he gets through exclaims breathlessly, "There, I guess the central office will know that I mean business, now."

If the central happens to answer promptly after this tempest of rage, the man is pretty apt to say, "that fetched her and I knew it would."

But the fact is all his violent turning of the crank was lost to all except himself. After the first call not a sound reaches the central office. When the annunciator falls on the first revolution of the crank it stays down till the call is answered, when it is again put back in its place to await a fresh call. Those people who have in the past wasted so much energy in trying to let the central office know that they mean business will now be apt to save their surplus strength for more profitable employment. Another thing: A simple turn or two of the crank does the work just as effectually as a hundred revolutions.

OTHER THINGS WORTHY OF NOTE.

The reason why the operators are able to talk in such a low voice and yet be distinctly understood is owing to the finer adjustment of the instrument. While the voice from the central office is clear and distinct a mile away, if one were standing by the operator's side the words would be barely distinguishable.

Occasionally the ears of the lady operators are assailed with improper language. In such cases no pains are spared to trace the matter home. In some cases of profanity the telephones have been removed. The voice is usually the detective in placing it upon the right shoulders.

One troublesome thing which the company is preparing to meet is the free use of telephones by non-subscribers. Many people seem to think that the telephone is public property, and that they are free to use it at all times and under all circumstances. This abuse is to be met by positive orders forbidding subscribers to allow outside parties to use the telephone. Many citizens who would not knowingly do a wrong act, frequently step in and use a neighbor's telephone free when it is something he ought to pay for, quite as much as for his horse car rides or any other convenience he indulges in which costs money.

Here are a few things worth remembering: 1. Every call is answered as speedily as possible. 2. A second call does no good, except in case the wire was temporarily out of order when the first call was made. 3. There is no use in thundering away at the crank, thinking it is heard at the central office, for it is not. 4. It is not right for a non-subscriber to use a telephone unless he goes to the central office and pays for the privilege. Heed these few things, and there will not be much reason to curse the telephone.

Suits in which the Bell Company is Engaged.

WHAT A NEW YORK MAN SAYS OF ITS CLAIMS AND THOSE OF ITS OPPONENTS.

A gentleman who for eight years has been prominently identified with telephone interests, and is at present president of three companies and has large interests in the telephone business, recently said during a conversation, that the case between the Bell Telephone Company and the Overland Telegraph Company, that was recently heard in Philadelphia by Judges Nixon, McKenna, and Butler, that the true story of this telephone litigation has never appeared in print. Of course, the Drawbaugh people have had the run of several newspapers throughout the country, and through these they have presented their alleged grievances. Alexander Graham Bell holds over one thousand patents on the telephone. In 1881 Daniel Drawbaugh, of Eberly's Mills, Pa., made application to the Patent Office at Washington for a patent substantially the same as Bell's. Of course it was refused. In the time from 1876 to 1881, capitalists had begun to discern that the telephone was to become a great institution, and Drawbaugh found no difficulty in enlisting sympathizers for his claim. He came to New York, began to manufacture telephones, and put one of them in use. This was during last spring. The Bell people immediately sought an injunction restraining Drawbaugh from using the telephone, and the Circuit Court for the Southern District of New York granted them a preliminary injunction The time came for the argument, before Judge Wallace, on the motion for a perpetual injunction, and all the evidence had been put in and the case closed when counsel for the Drawbaugh parties made a request that it be reopened, on the ground that evidence had been newly discovered that still further strengthened the Drawbaugh interest; and they further prayed that a commission be appointed to take the evidence in Harrisburg, Pa. Judge Wallace appointed a commission to take evidence, and they are at present engaged on the case in Harrisburg, where most of the witnesses belong. That is the first phase of the testimony.

Four months ago, the Overland Telephone Company, of which R. G. Dun, who owns a commercial agency in this city, is president, began to put out in New Jersey the Baxter telephone, of which they are the owners. The Baxter telephone, although essentially the same telephone, in two or three minor features differs from the Bell. The Bell Telephone Company commenced action against them for infringement of their patent. The case came up two weeks ago, in the Circuit Court sitting in Philadelphia, Judge Nixon presiding. Judge Nixon deemed the case and the questions involved of such importance that he requested Judges McKenna and Butler to sit with him, and they consented.

The counsel of the Overland Company, in their answer, did not claim their telephone was not an infringement on the Bell, but answered that Bell was never entitled to the patent, inasmuch as Drawbaugh, as long ago as 1868, eight years before Bell got his patent, had the telephone in constant use. The statutes relating to the Patent Office and patents say that, if a patent has been in use two years, no patent shall issue to the patentee. Therefore, the counsel claimed Bell had no right to the patent, and no right to bring the action for an infringement. They asked to be allowed to present the evidence on their side that had been given before Judge Wallace, in New York, on the Drawbaugh side. Counsel for the Bell Company were obliged to let them present this evidence, 4,000 printed pages, for fear the impression would get abroad that they were afraid to meet the Drawbaugh evidence in a Pennsylvania court.

After four days' patient hearing, the Court came in and said that they had decided that it would be very unwise to render a decision in a case that was then pending before another court; therefore, they would let the suit for an injunction remain in *statu quo* until the case before Judge Wallace was decided, when the case against the Overland Company would be judged by the same ruling.

Counsel for Bell said that they were unable to put the case to a decision, and were only too anxious to have the case in New York decided.

Judge Nixon thereupon said that if within a reasonable time the case in New York was not decided, the plaintiffs could reopen the case before his court, and he would render a decision upon the points presented. And thus it stands, waiting for a decision by Judge Wallace One Marcus Marx, a New York broker, and Parker C. Chandler, of Boston, are backing up the Drawbaugh case. These men, with several others, organized the People's Telephone Company, with $10,000,000 capital, in $50 shares, which are at present selling at $10 each. After the People's Company had been some time in the field, the managers of that company organized a branch company to operate in Pennsylvania, New Jersey, Maryland and the District of Columbia. The capital stock was $15,000,000, at $15 par value per share; $7.50 per share was to be paid upon subscription, and the remainder when the company established their right to the patent, which they can never do. Why, the capitalization of the Pennsylvania scheme would more than half pay for the plant that has been in operation in that section of the country for the past five years. This company now operating there has 30,000 subscribers, is well established, and, notwithstanding this, is not worth more than $10,000,000. Drawbaugh says that the reason he did not apply for a patent sooner than he did was because he had no money with which to pay for the patent. In the testimony, the Bell Company proved that at the time he was so poor he had paid his father $1,000 in a lump sum, had taken out patents for several inventions, among them a bread-kneader, owned real estate, taxed at a valuation of $2,700, with a mortgage of $300, and was receiving rental on this property all the time. During this period, according to his testimony, he had not thought it worth his while to take a patent out in the telephone, but had gone to the trouble of patenting a bread-kneader, and also had attended the Centennial Exhibition, where the Bell telephone was being shown, but had not thought it necessary to see it, though he had been working for eight years up to that time "perfecting" his telephone. It's all bosh—this case of Drawbaugh—and they have not the slightest show in the world. They try to make capital out of George F. Edmunds, of Vermont, being their lawyer, but any lawyer will take a case if he gets a retainer. That is the true aspect of the case as it stands, and it will never be materially changed.

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President Bates Cross-Questioned.

The Baltimore and Ohio Telegraph Company have made considerable progress during the week just past. That is to say, they have taken steps of so much importance as to denote a firm resolve on the part of that company to organize an efficient competition with the Western Union telegraphic octopus.

Mr. Robert Garrett, president *pro tem* of the Baltimore and Ohio Railroad Company, and D. H. Bates, president and general manager of the Baltimore and Ohio Telegraph Company, appeared last week before the Senate Post-Office Committee, and gave their opinions regarding the proposed postal telegraph measure now before Congress.

In response to request, Mr. Bates outlined the present and prospective Baltimore and Ohio telegraph system by stating that the company now has commercial lines extending along the route of the Baltimore and Ohio Railroad from Baltimore to Washington, Wheeling and Parkersburg, over the Pittsburgh and Connellsvile road to Pittsburgh, from Wheeling via the important points on the Central Ohio division to Newark and Columbus, Sandusky, Chicago Junction and Chicago; also lines from Parkersburg to Cincinnati and St. Louis, with a branch from North Vernon to Louisville; that it also owns its lines from Baltimore to New York city. It has within a few weeks purchased a newly built line over the West Shore and New York, Chicago and St. Louis railroads from New York city by way of Buffalo to Chicago. All these lines are practically new, those not just built having been rebuilt within a year. They are thoroughly equipped and cover the principal cities within the area described. The company operates now fifteen wires by two routes between New York city and Chicago, which is fully one-half the number the Western Union Company has between those points, and on other roads perhaps the same proportion.

As might be expected, Mr. Bates restricted his testimony to the work which the company is actually doing or has given out contracts for, and said nothing regarding the very important contracts with the railroad companies, which we recently outlined. These, if successfully negotiated, are likely to prove far more advantageous to the company than even the new lines it is now building, because they will result in forcing the Western Union Telegraph Company to build many new lines with the result of adding still more to its immensely inflated capital, and, consequently, to greatly increase their interest account,

Of actual work now being done, Mr. Bates said that the company is now engaged in building a first class line between New York and Boston, taking in the principal cities on the route, which will be finished by June 1. It is also engaged in building a line from Chicago to St. Louis, via Indianapolis, branching from that point to Cincinnati; also from Pittsburgh to Cleveland, thence to Chicago Junction, giving cross connections and better facilities than can be obtained by one line only. It has just closed arrangements with an existing telegraph line from St. Louis by way of Cairo to Texarkana and beyond, and has arranged for a further extension of that line to Houston, Galveston and New Orleans. The company intend to provide its lines between the great cities named with the most ample facilities for the public and the merchants and others using them. Arrangements have also been completed with another company in close connection with the Baltimore and Ohio for the immediate building of a line from Chicago via LaCrosse to St. Paul, Minn., and other important points in the Northwest, so that within the present year the Baltimore and Ohio telegraph system will cover territory which now yields, he understands, nearly or quite three-fourths of the entire telegraph business of the country. With abundance of wire and complete equipment of all kinds to handle all the business that can be secured within that territory he looked for good results.

He said—and he told us no news when he said it—that the present rates for messages were altogether too high; that a company working on honest capital could afford to give the public much cheaper rates and still make money, and in that he only concurred in what the REVIEW has been saying all along. His company, it seems, propose to charge for despatches to all the principal cities east of the Mississippi twenty-five cents, and one cent a word for night messages.

Then Mr. Bates took up the question of efficiency of what is called the Nickel-Plate line which, as our readers will remember, was called in question by Mr. Jay Gould in a recent interview, and after his negotiations for purchasing it had fallen through.

Replying to the chairman's inquiries, Mr. Bates said the lines of the Nickel Plate, in comparison with other telegraph lines, he believed from reports from both sides to be the best in the country. The policy would be not to undertake too much in the way of immediate extension, but to give ample facilities between the most populous sections and as nearly uniform rates as possible. The Baltimore and Ohio Company now has 35,000 miles of wire, and provision has been made for stringing 15,000 miles additional this year. The company has secured the use of all patents essentially necessary to operate its lines effectively and economically. On the line between New York and Boston ten wires are immediately to be strung, with facilities for twelve more to be afterward added. On the line from Chicago to St. Paul and Minneapolis, by way of Lacrosse, four wires will be strung immediately and eight additional wires afterward.

Mr. Bates then went on to say that the American Union Telegraph Company, though covering about the same territory as his company cost $5,000,000, while his companies lines—the same number of miles—cost only $3,000,000.

Mr Bates wound up his testimony with the following interesting responses to the inquiries of the Congressional Committee:

"Chairman Hill inquired whether telegraph companies could not construct their lines over rights of way and in cities and towns under the act of Congress of 1866, relating to making railroads and other highway post routes. Mr. Bates and Mr. Cowen, counsel of the Baltimore and Ohio Company, held such right existed, provided the owners of properties were properly compensated, but numerous conflicts and litigations showed that it could not be enforced Mr. Cowen said that the Supreme Court had held that the Wabash road having given access to its right of way to one telegraph company could not exclude another, but that the Court had never held that a telegraph company could force itself upon a private right of way. The decision was against discrimination, and even corporations, like individuals, would be entitled at any event to compensation for such use. He ventured to say that the American Union had paid the Pennsylvania Railroad Company, for railroad privileges a sum that capitalized would equal the cost of its entire plant. Litigation and strife generally arose from one company already in possession attempting to exclude others seeking equal privileges.

"Mr. Bates said the American Union Company, within his knowledge, paid a very large sum in cash in the Pennsylvania Railroad and other Pennsylvania companies, to the Pittsburgh, Cincinnati and St. Louis company; and in other ways incurred cash outlays from year to year, besides telegraphic facilities furnished the Wabash and other companies for the use of their rights of way—he estimated in the neighborhood of $150,000 to $250,000 a year. As regards the act of Congress of 1866, he knew the Atlantic and Pacific, American Union, and later the Baltimore and Ohio Telegraph Companies, had undertaken to secure rights of way under that act, but he did not remember an instance where they had succeeded in such endeavor.

"Answering an inquiry from Senator Wilson, Mr. Bates said that in the majority of the Western Union contracts there was a clause to the effect that the railroad companies along whose lines telegraph lines were constructed, should not transport material for other telegraph companies. Explaining this he said, while the contracts did not provide that there should be no transportation of material for any other telegraph company, the contract did not provide that the railroad company, should only haul the rival telegraph company's poles, &c., between stations at the regular local tariff prevailing for like material, which practically amounted to a prohibition, as the poles must be distributed, of course, along the entire route."

Can Electricity Compete with Gas?

An esteemed coutemporary of ours, *Engineering*, the leading English scientific journal, is inclined to take a somewhat gloomy view of electric lighting prospects. It would seem as though it had been led to this by a comparison between the cost of gas and electricity, rather than by examination of the relative merits of the two illuminants.

The REVIEW, which is and always has been in favor of looking at things as they are, and not as it would like to see them, has ever maintained that this sort of comparison was unfair; that electricity, save when generated in large quantities, can *not* be supplied as cheap as gas; and even then, when the value of the residuents of gas manufacture are taken into consideration, gas will be found to be cheaper. But we claim—and we doubt if inteligent persons can be found to refute it—that electricity as an illuminant possesses so many advantages over gas, that the question of difference in cost counts for absolutely nothing.

Adulterated beer, fortified and loaded wines, and fraudulent and poisonous teas are far cheaper than honest ale, pure wines and teas; but does that make it impossible for the pure articles to find a market? Not at all.

If other proof were wanting that the electric light is able to compete with gas, the fallacy of the argument put forward by our contemporary might readily be found in the fact that electric lighting plants are now in successful operation both in Europe and America in almost numberless quantities, and the success had with these is encouraging capitalists all over the world to put their money in similar enterprises. Great shops and factories all over the United States are and have been for some time running to their utmost capacity in order to supply the demand made for electric lighting apparatus.

Our contemporary says it is remarkable that every battery inventor asserts that his cells consume less zinc than would be theoretically expected, according to received ideas. Some merely say that their experience justifies them in making this statement, while one, Mr. O. C. D. Ross, advances a theory in support of his view.

We can not see that this is remarkable, since inventors, ever since their appearance, have been inclined to claim more for their inventions than their subsequent trials have served to corroborate Mr. Ross, in our estimation, makes out a rather strong case; but even if we are in error in this—and we do not pretend to be infallible—the practical working of his batteries when they shall come to be tried will very quickly settle the disputed point, just as many other descriptions of batteries now in operation are doing.

He begins, it is said, by pointing out the mutual convertibility of heat, chemical energy, and electricity, and he argues rightly enough that since a given metal will evolve different amounts of heat in entering into combination with different bodies, it will, therefore, be consumed at different rates in a battery producing a given amount of electric energy, according to the nature of the acid or fluid by which it is attacked.

When one gramme of hydrogen unites with one equivalent of oxygen, it develops 34,462 gramme degrees of heat, and when it unites with an equivalent of sulphur, it develops only 2,741 units of heat (Watt's "Dictionary of Chemistry.")

But, says our contemporary, a current of one ampère with an electromotive force of one volt, or flowing through the resistance of one ohm develops 0.24 units per second. There-

fore, he argues, "as a current of one ampère develops .24 heat units per second, and as one gramme of hydrogen, when combining with its equivalent eight grammes of oxygen, develops 34,462 units, it follows that $\frac{0.24}{34,462} =$ 0.000007 grammes of hydrogen would be liberated in one second under the influence of one ampère of current. That, then, as commonly understood, would be the electro-chemical equivalent of hydrogen." But there is no fact better ascertained in science than that the electro-chemical equivalent of hydrogen is .000010, for it has been experimentally determined again and again, while that of water is .000092, or nine times that of hydrogen. Whence this difference, then? The standard tables are calculated on the assumption that one absolute electro-magnetic unit of *current* (ten ampères) will in one second decompose .00092 gramme of water, as has been experimentally determined. But this unit relates only to the intensity of the current, and takes no note of its electromotive force, and consequently none of its energy. It requires a potential of 1.45 volts to tear asunder the constituent atoms of water, and consequently, if we wish to calculate the work expended, we must say that .000010 gramme of hydrogen will be liberated per second under the influence of a current of one ampère with an electromotive force of 1.45 volts, and this corresponds with Mr. Ross's .000007 gramme with unit current and unit electromotive force.

Now, the combination of the same quantity of hydrogen with chlorine evolves 23,783 units of heat, and with sulphur 2,741 units, and therefore, following Mr. Ross, under a current of unit energy .0000101 gramme, and .0000875 gramme of hydrogen will be evolved, from such combinations respectively. Zinc in combining with oxygen, chlorine, and sulphur, evolves 1,306, 1,547, and 644 units of heat respectively, and from this Mr. Ross calculates that in a battery in which zinc combines with oxygen ("from nitric or nitrous acid and from water") the theoretical consumption per horse-power per hour will be 1.1015 lb. If the zinc combines with chlorine, .9295 lb. will represent a horse-power, and if with sulphur "from sulphuric acid," 2.2330 lb.

But the proof of the pudding is in the eating thereof, and we shall be much surprised if Mr. Ross, if given a fair trial, is not able to prove his case.

Dodges Telegraphic.

The testimony of President Garrett, of the Baltimore and Ohio Railroad Company, before the Congressional Committee last week does not accord with the rumors, still uncontradicted, that the Baltimore and Ohio Telegraph Company is ready to sell out to the Western Union Telegraph Company.

The Baltimore and Ohio Railroad Company is owner of the telegraph company of the same name, and hence Mr. Garrett may be supposed to know just what its intentions are, and, while doubtless many believe that he has honestly stated these intentions to the Congressional Committee, all will agree that the rumors now circulating, which cast a stigma of falsity upon them, should, even if unfounded, be given the lie. A daily paper reports that—

"At the office of the Western Union Company it is repeated that nothing is known of a contemplated lease of the Baltimore and Ohio Telegraph lines by the Western Union Company. An officer of the company said that, while no overtures had been made to the Western Union Company, there was little doubt that the Baltimore and Ohio Company are in the market, and ready to sell out or lease their lines whenever a favorable opportunity is presented. It was not generally known, he said, that the Baltimore and Ohio Company a year and a half ago were extremely anxious to lease the lines to the Mutual Union Company. The former went so far as to send the general manager to this city, equipped with maps and statistics, with a view of transferring the property to the Mutual Union Company. The Baltimore and Ohio folks, however, demanded such high terms that the offer was rejected, and, the Mutual Union soon after passing under control of the Western Union Company, the negotiations fell through. This fact, the official thought, was conclusive evidence that the Baltimore and Ohio Telegraph Company is not such an independent and formidable organization after all, and will be ready to sell out whenever a favorable opportunity presents itself. It is also learned that the lines of the National Telegraph Company, which were acquired by the Baltimore and Ohio Company a few days ago, had been offered in turn to the Produce Exchange, Mutual Union Company and Western Union Company, and declined by each. At the office of the Bankers and Merchants' Telegraph Company none of the officials knew anything of a contemplated transfer of that company's lines to the Western Union Company, as had been reported."

There are those who say that the statements made by Mr. Garrett before the Congressional Committee, regarding the very flourishing condition of the Baltimore and Ohio Telegraph Company and the intentions of its managers in the future, were little short of buncombe, intended either as a temptation to Congress to purchase it for a postal telegraph, or to frighten Western Union into a bid.

There is only circumstantial evidence to sustain this view, yet the public, so often sold out before, after equally strong protestations, may very reasonably be excused if it hesitates to pin its faith upon a company which permits such direct contradictions of its publicly-stated intentions as those contained in the above interview.

Before the Congressional Committee Mr. Garrett said that the Baltimore and Ohio Railroad Company has already expended a very large sum of money in the acquisition of certain lines, and expected to expend a great deal more. The time for investment in the telegraph material seemed propitious. Large quantities of material for construction had been contracted for at cheaper rates than he had ever known to previously prevail. It had entered into contract obligations for the building of additional lines to perfect its present compact, and, therefore, it became very important for his company to know what course the Government intended pursuing in telegraph matters. His company did not want to see the Government enter into competition with private telegraphic enterprise after it had entered the field. He presumed that the chief concern of the Government was in reference to what has followed previous telegraphic competition, namely, consolidation. While he did not know what guarantee against consolidation would be satisfactory to Congress, so far as the Baltimore and Ohio was concerned, he might point to its general policy. This constant policy, and the further fact that his company had expended large sums and had arranged to spend still larger sums of money extending its present system, was the best assurance he could offer Congress and the country that his company would in the future, as in the past, make no consolidation inimical to the general welfare. If the Government desired further guarantee, the company was prepared to enter into a contract with the Post-Office Department for the transmission of Government telegraphic business, under such guarantees as to rates, fidelity of transmission, etc., as any commission appointed by the Government considered fair and equitable; or if Congress was determined to enter the telegraphic field, but did not see its way clear to do so immediately, and was willing to enter into a fair arrangement, the Baltimore and Ohio Company would go on with the construction of its lines, so as to afford the public immediately the advantages accruing from competition, and extend telegraphic facilities at the earliest date, and would probably agree to turn over its lines to the Government at cost, plus a proper remuneration for its venture and for rights of way, as such previously referred to.

The chairman of the committee, Mr. Hill, showed his perception by here interrupting Mr. Garrett with the question as to what the Baltimore and Ohio Telegraph Company would do in the event of the Western Union Company offering *greater advantages than it could secure through competition?*

Mr. Garrett succeeded in eluding this too pointed thrust by remarking that he thought the days of consolidation were passed, which, though a very pretty commentary upon the anticipated Utopian blessedness of the future, could scarcely be looked upon as an answer even by those most easily satisfied.

The Western Union, so said Mr. Garrett, was the result of some sixty consolidations, more or less, and, it was true, had hitherto finally absorbed all rivals. The Baltimore and Ohio Company had been willing, and had made co-operative arrangements with the other independent lines, but when they finally consolidated with the Western Union it had always withdrawn from its alliance with them. He could see no inducement which would lead his company, when in possession of a system the entire cost of which would not exceed $3,000,000, and the nucleus of which (that is, the Baltimore and Ohio system proper) was nominally capitalized at not exceeding $20,000, and which covered the territory from which the Western Union derived seventy-five per cent. of its entire revenue, to consolidate with that company, with such heavy burdens as its watered capital imposed upon it. The Baltimore and Ohio Company had a theory that by building its line for cash, and serving the public at equitable rates that could be fixed by a Government tribunal, it could make better revenue for its stockholders than could be obtained from consolidation. The company must always maintain a large telegraphic service for its railway business, and was now only taking advantage of a good opportunity to extend that service for the benefit of the public, as well as for the system which it was bound necessarily to obtain.

From this we would gather that the Baltimore and Ohio has no scruples against selling out the public, but it does not believe that Western Union could afford to put up a sufficient number of scudi to buy it out. In other words, the Baltimore and Ohio Telegraph Company would seem, like Don Juan's fair friend, to court temptation.

Chairman Hill said—"Mr. Garrett, you propose building competing lines and making competition general throughout the country, and when you have made certain expenditures the Western Union will put down rates to all the points you reach, and will likely raise rates to the points you do not reach, the result of which will be a proposition from them to you to take your lines at an advance. You will find it impossible to make money under the pressure they will exert, and you will either run your lines at a loss or succumb."

Mr. Garrett answered that if the Western Union, on a watered stock of $80,000,000, can earn dividends, that the small capitalization of the Baltimore and Ohio Telegraph Company would enable it to make as satisfactory earnings, at a much smaller rate, than the Western Union could afford to make. His company was willing to do well and let others do better if they could. The Western Union, between New York and Chicago, has, he understood, in all thirty wires; his line would soon have twenty-seven, and would be as strong in Chicago as Mr. Gould is. He has also just bought a district company in New York, which would give his system large and numerous offices, and enable it to immediately organize an effective service. The company has already under lease wires between the cities of New York and Chicago that yield an average rental of $19,000, aggregating a fair interest on the entire amount it proposed spending; that it could, at any rate, live, even if rates were put below bed-rock by the Western Union. But there was this further consideration, how could the Western Union go on paying dividends on its eighty millions of stock, plus its guarantees and other obligations, if it cuts rates below what would yield a net revenue? How could they maintain it as an investment stock?

From all this it would appear that the Baltimore and Ohio Telegraph Company believe that they can make more money by fighting Western Union than by consolidating with it; and, so long as this is the case, the public may look upon it as a friend; but, should they ever be able to obtain more from the Western Union than a legitimate working of their lines will command, the public may look to see its interests thrown to the dogs.

The Wiles of the Gas Companies.

The ingenious but somewhat apparent ruse adopted last week by a gas company, or some one interested in it, to manufacture a little confidence on the part of consumers in the disinterestedness of those who furnish them with gas, has led to even more disastrous results than we predicted. It has called out a number of indignant protests, and is likely to do the gas companies no end of harm. That is to say, it is likely to bring out the whole truth regarding their extortionate charges, and may end in a complete exposé not only of their methods of doing business, but of the dangerous qualities of the fluids they vend.

The original letter, which has called out these responses, must have been written by some new and verdant officer of a gas company, who has not learned that the one policy of the gas company is to get all you can, and keep mum. No doubt he has been summarily ejected by this time, and his fate will serve as a terrible warning to other and similarly ambitious aspirants for gas company laurels. Any of the sly old foxes that haunt the purlieus of the executive officers of the gas companies, could have foretold the consequences of this complimentary-letter-from-consumer racket.

It is well for the gas companies that their ambitious official did not say in his "letter from consumer" that he found the gas agreeable and healthful, for that would have assuredly led to the publication of a mass of very damaging testimony in this regard.

Here are two of the letters brought out by the original publication:

GAS BILLS.

To the Editor of the New York Times:

Having seen several articles in your paper relating to gas bills, I would like to state that my experience does not coincide with that of the gentleman residing in a four-story house between Fifth and Sixth Avenues. I have a small apartment, with no gas in kitchen, and my gas bills average about $85 to $90 a year. Is the gentleman who is so satisfied with his bills a manager of the gas company that supplies his house? I find my bills are largest the months that least gas is consumed. It is useless to appeal to the gas companies; my only result in so doing is an increase in bills.

OCCUPANT OF A MADISON AVENUE FLAT.

THE LONDON PRICE OF GAS.

To the Editor of the New York Times:

In your issue of the 2d inst., relative to the gas question, I notice "Sufferer" quotes gas in London, England, as $1 per 1,000 feet. I beg to correct his statement. Three out of the four companies there sell gas at 2s. 10d. per 1,000 feet, or 70 cents, the other company charges 3s., or 75 cents, and on a paid-up capital of $67,000,000 pay a dividend of 12½ per cent. per annum. He also regrets the oversight of the authorities in giving the gas companies the privileges they have, at the outset. Does he not know that the Mayor and Alderman did the same thing again last year, so that another gas works will have to be provided for next year?—the Equitable—but don't expect gas any cheaper. The fact is the more gas companies there are the dearer gas will be, and as the companies are under no legal obligations, nor have they any legal protection, consequently they make hay while the sun shines. But if the New York sufferers want gas as cheap as it is in London or Paris, let them follow the example of those cities. The raw material is just as cheap here as in England, and the quality is superior.

JOHN KEELING, C. E.

No. 158 West Forty-sixth St., New York.

Wednesday, Feb. 6, 1884.

The writer of the first of these letters has discovered, while examining his bills, that the gas companies charge him most at those times when he uses the least gas. This curious phenomenon seems to surprise him greatly. If he thinks he is the first to discover it, he is greatly mistaken. It has been observed by nearly every one who is so unfortunate as to be compelled to use gas.

General Sickles, of this city, made a more curious discovery than this. He discovered that he was charged most for gas when his house was unoccupied and his family away.

We will not pretend to say that we can satisfactorily explain the latter phenomenon; but, after carefully examining the former—reduced to the proposition: Why do gas companies charge most when the least gas is used?—we have found, we think, a solution of the problem, and hence of the mystery consequent thereupon.

It is but right that we should begin by recounting and going over the various data

collected in our examination of this interesting and, at the same time, instructive proposition.

When Gen. Sickles refused to pay his gas bill, on the ground that it was excessive, the gas company sent their meter examiner to his house to re-examine it. On his return, the examiner reported that his former reading of the meter, on which the charge was founded, was altogether too small; and, instead of being an injustice to Gen. Sickles, was, in reality, a grave injustice to the gas company. Then Gen. Sickles proved that his family were out of town, his house locked up, and consequently no gas whatever burned. Yet the gas company and their examiner were skeptical. Knowing that these so-called meter inspectors, in nearly every case of re-examination, almost redouble their former reading, we looked into the construction of gas meters and came to the conclusion that of all meters gas meters are at once the most untrustworthy and the most easily manipulated by unscrupulous companies; that meter inspectors have more to do with computations as to how much consumers will stand, than with reading the grossly exaggerated indices of their meters; and that in these calculations the escape of gas during the day, when the pressure, or a portion of it, is kept on—estimated at fifteen per cent.—is invariably charged against the consumer. Add to this the fact that gas consumes the vital principle of the atmosphere and contaminates it, and it is not at all surprising that the gas companies can scarcely point to one friendly consumer, and that a word in their favor appearing in the public prints will call out an endless number of bitter retorts, in which even those who do not use gas cannot but help sympathizing with the writers thereof.

The public demand a good, healthy light supplied by reputable men, and in the very near future the public will find that electricity and electrical companies are entirely able to supply their demand.

The sooner we get rid of those noxious fumes known as illuminating gas, and the exacting, pettyfogging knaves that dispense much of it, the better it will be for us all.

Patent Office Work of 1883.

The Hon. Benjamin Butterworth, Commissioner of Patents, submitted his annual report to Congress January 29. From it we learn that the total receipts of the office for the year 1883 were $1,146,240, and the expenses $675,231. There was in the Treasury to the credit of the Patent Office, at the commencement of the year, $2,205,471; and adding the excess of receipts over expenditures for the twelve months, this fund amounted, on the first of January last, to $2,676,476.

The total number of applications relating to patents was 34,576, of which 33,073 were for inventions, 1,238 for designs, and 265 for reissues. There were 2,741 caveats filed, 915 applications for registry of trade marks, 834 for registry of labels, 18 disclaimers, and 640 appeals, making a total of 39,724 cases for investigation and action.

The number of patents issued in 1883, including designs, was 22,216, and there were 167 reissues, or a total of 22,383, against 19,267 patents and reissues in 1882, and 16,584 in 1881. There were also 902 trade marks registered in 1883, and 906 labels, while 8,874 patents expired, and 2,366 were withheld for non-payment of the final fee.

New York State received the largest number of patents, 4,359, Massachusetts following with 2,173, and Pennsylvania with 2,168; then come Illinois with 1,792; Ohio, 1,604; Connecticut, 883; Michigan, 727; Indiana, 712; Missouri, 625; California, 596; Iowa, 445; Wisconsin, 394; Rhode Island, 327; and Minnesota, 310. The United States Army is credited with 6 and the Navy with 3 patents. According to population, the District of Columbia received one patent on the average for 318 inhabitants, Massachusetts one for 320, Connecticut one for 765, and Rhode Island one for 845, the fewest patents in proportion to population being issued to Mississippi, which received one for an average of 22,188.

The patents issued to citizens of foreign countries numbered 1,259, or 124 more than were so issued in 1882. England takes the lead with 435, followed by Canada with 251, Germany 235, France 179, Austria 33, Switzerland 22, and Belgium 20.

The Western Union Telegraph Company will accept business for transmission free on account of the Ohio river flood sufferers.

ELECTRICAL PATENTS

INDEX OF INVENTIONS FOR WHICH LETTERS PATENT OF THE UNITED STATES WERE GRANTED IN THE WEEK ENDING FEBRUARY 12, 1884.

293,242 Insulator for electric wires; Albert W. Hale, Plainfield, N. J.

293,256 Holder for incandescent electric lamps; Jean Languereau, Paris, France.

293,271 Method of and apparatus for laying branch underground electrical conductors; William J. Phillips and George L. Kitson, Philadelphia, Pa., assignor to said Philips.

293,272 Automatic feeding apparatus for voltaic batteries; Frank L. Pope, Elizabeth, N. J.

293,318 Electrical extension bracket; J. Edwin Giles, Hazleton, Pa.

293,330 Electro-magnetic gas-lighter; Evans H. Jenkins, Richmond, Ind.

293,338 Magnet; Charles Matthews Many, Brooklyn, N.Y.

293,381 Electric railway signal; James C. Upham, North Sydney, and John P. Rogers, Elmsdale, Nova Scotia, Canada.

293,426 Means for measuring velocity by electricity; Frederick W. Cushing, New York, N. Y.

293,432 Electrical generator, or motor; Thomas Edison, Menlo Park, N. J.

293,433 Insulation of railroad tracks used for electric circuits; Thomas A. Edison, Menlo Park, N. J., assignor by mesne assignments to the Electrical Railway Company of the United States, of New York, N.Y.

293,434 Incandescent electric lamp; Thomas A. Edison, Menlo Park, N. J., assignor to the Edison Electric Light Company, New York, N. Y.

293,435 Electrical meter; Thomas A. Edison, Menlo Park, N. J., assignor to the Edison Electric Light Company, New York, N. Y.

293,441 Dynamo-electric machine; Frederick K. Fitch, New York, N. Y.

293,482 Mechanism for driving dynamo-electric machines; John R. Markle, Chicago, Ill., and James B. Wayne, Detroit, Mich.

293,495 Voltaic arc lamp; Otto A. Moses, New York, N. Y.

293,518 Means for electrically locating and following veins of metal in the earth; Jerome Prince, Milford, assignor by direct and mesne assignments to August P. Lighthill, Boston, Mass.

293,532 Manufacture of compound electrical wire, Luther L. Smith, Ansonia, Conn., assignor to the Postal Telegraph Company, New York, N. Y.

293,533 Underground wire conduit; Thomas L. Smith, New York, N. Y., assignor of one-half to Daniel A. Matthews, same place.

293,552 Socket for electric lamps; Sigmund Bergmann, New York, N. Y., assignor to Bergmann & Co., same place.

293,553 Combined gas and electric-lamp fixture; Sigmund Bergmann, New York, N. Y., assignor to Bergmann & Co, same place.

293,556 Electric motor; Walter Bradbury, St. Louis, Mo., assignor to George S. Calhoun, same place.

293,561 Telephone transmitter; Henry C. Buck, Somerville, assignor to Francis M. Holmes, Boston, Mass.

293,563 Electric battery; Charles L. Clarke and John Leigh, Manchester, County of Lancaster, England, assignor to the Domestic Electric Manufacturing Company, New York, N. Y.

293,571 Electric bell-ringing apparatus; Oscar Gassett, Boston, Mass.

293,612 Lightning diffuser; Leonidas G. Wooley, Indianapolis, Ind.

293,613 Electric clock; Gustav Maximilian Herotizky, Hamburg, Germany.

A printed copy of the specification and drawing of any patent to the annexed list, also of any patent issued since 1865, will be furnished by any of the patent solicitors whose advertisements appear in this journal. In ordering please state the number and date of the patent desired.

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New York and Pennsylvania Telephone Company	76	67
Southern Bell Telephone and Telegraph Company	125	120
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Iowa Union " "	100	95
Missouri and Kansas Telephone Co.	98	94
United Telephone Co. (Kansas and Missouri)	99	95
Bell Telephone Company, of Missouri	160	150
Wisconsin Telephone Company	120	115
Cumberland Telephone Co.	100	97
Great Southern Telephone Co.	100	95
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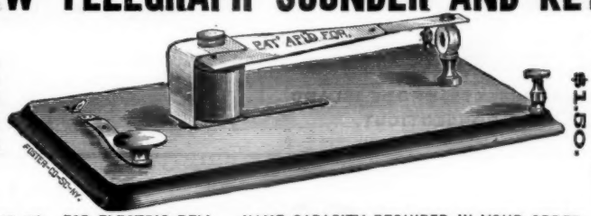

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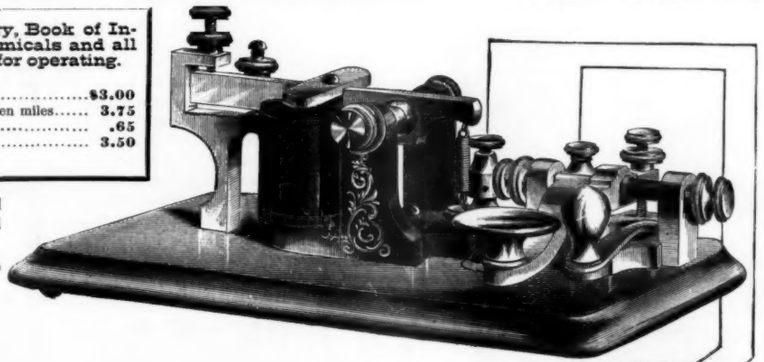

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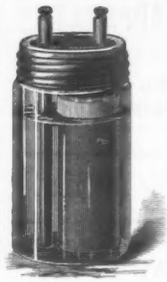

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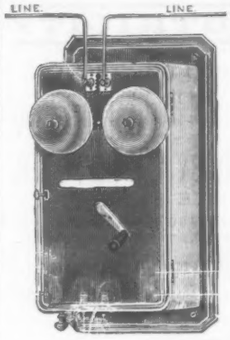

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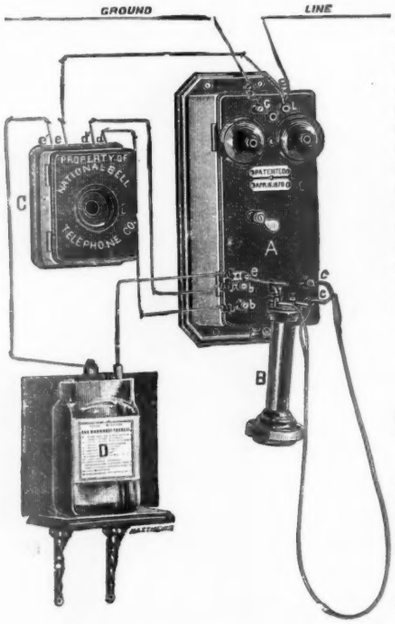

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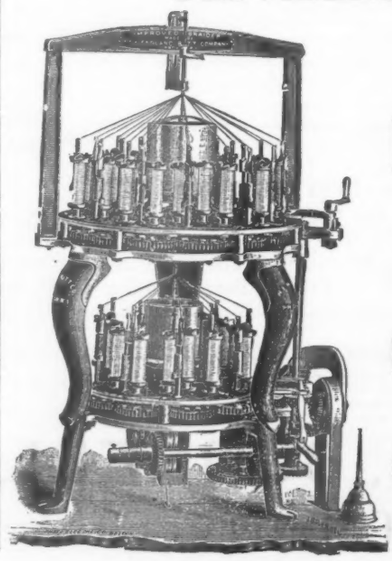

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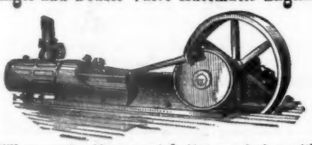

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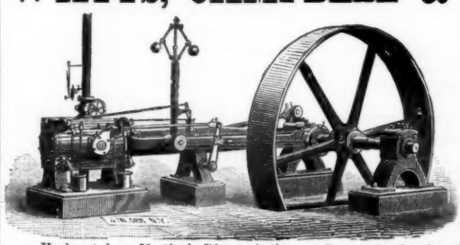

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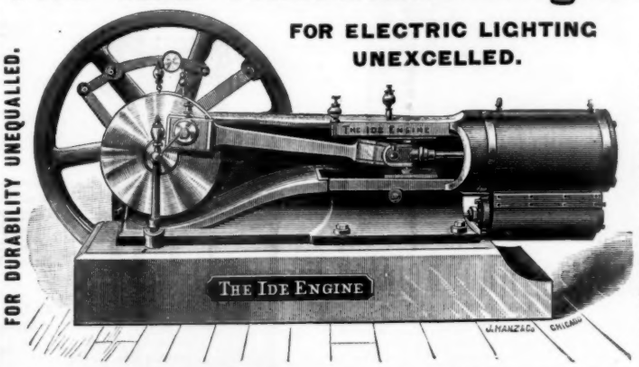

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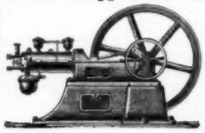

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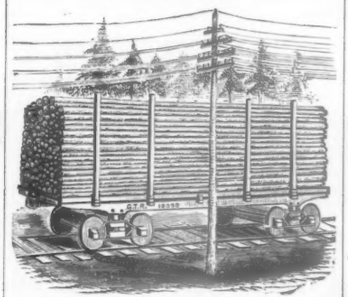

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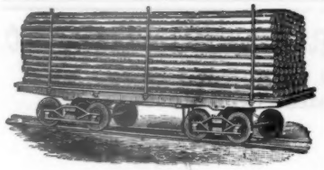

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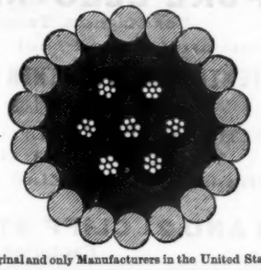

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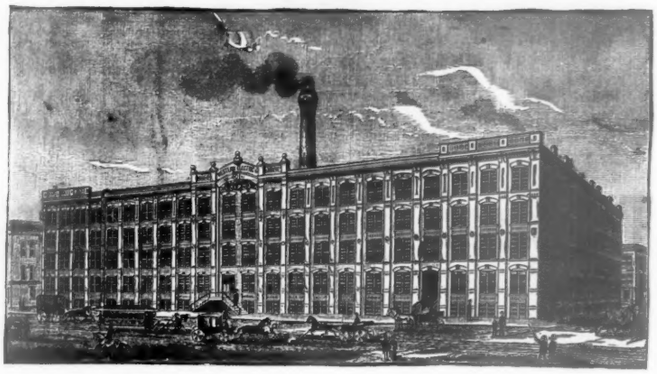

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